Gas Journal

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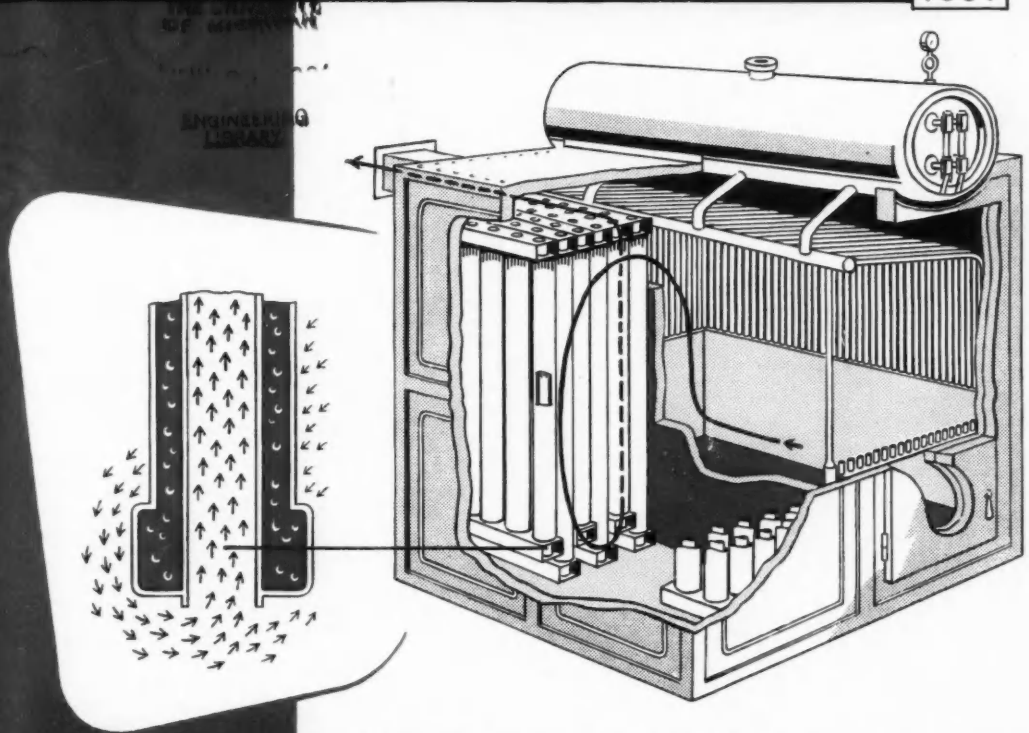

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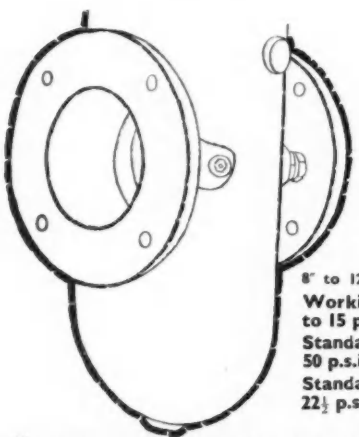

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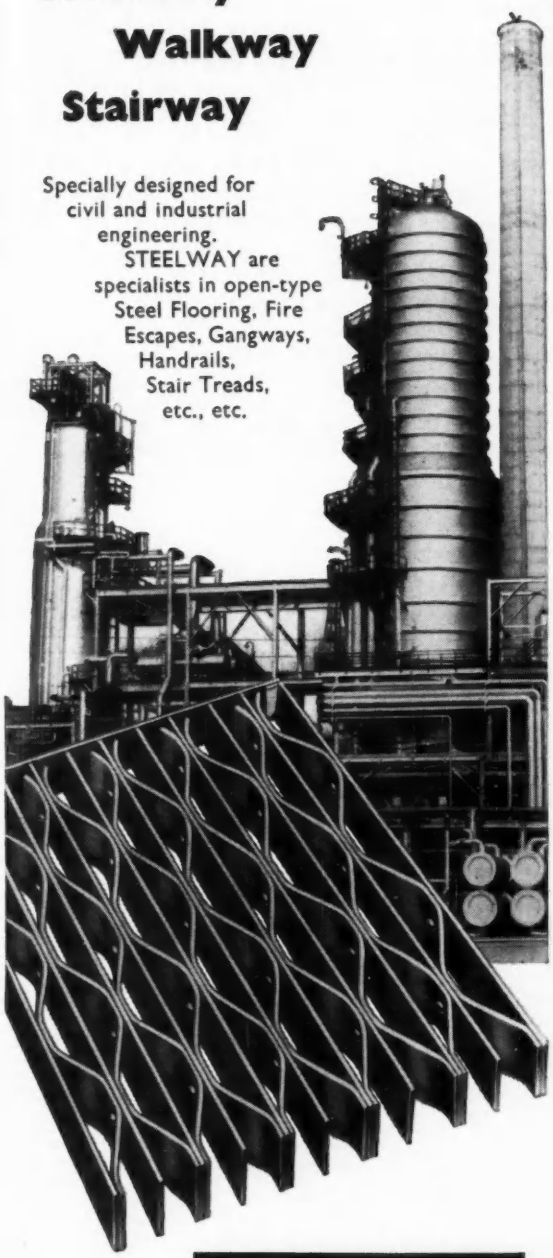

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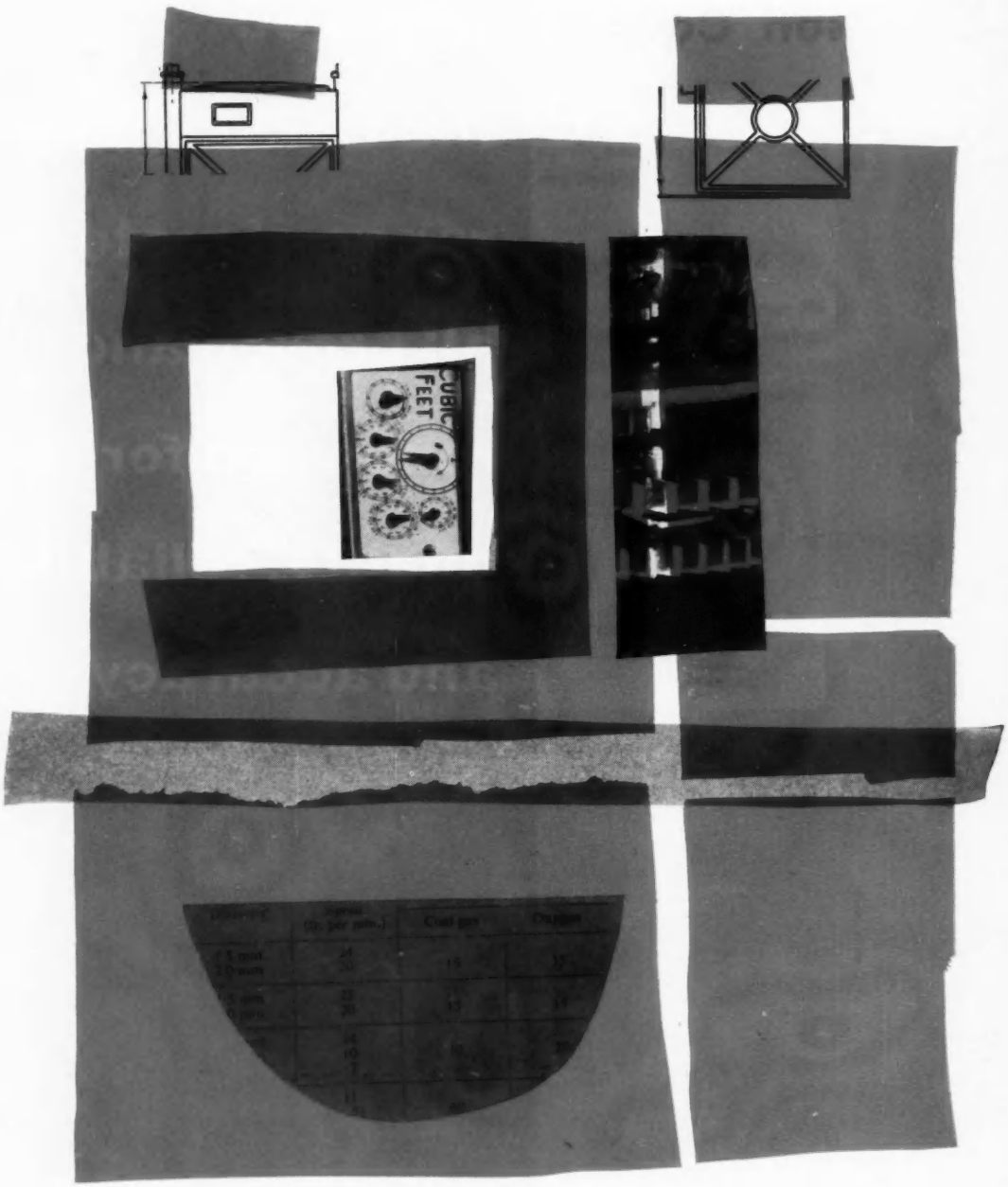

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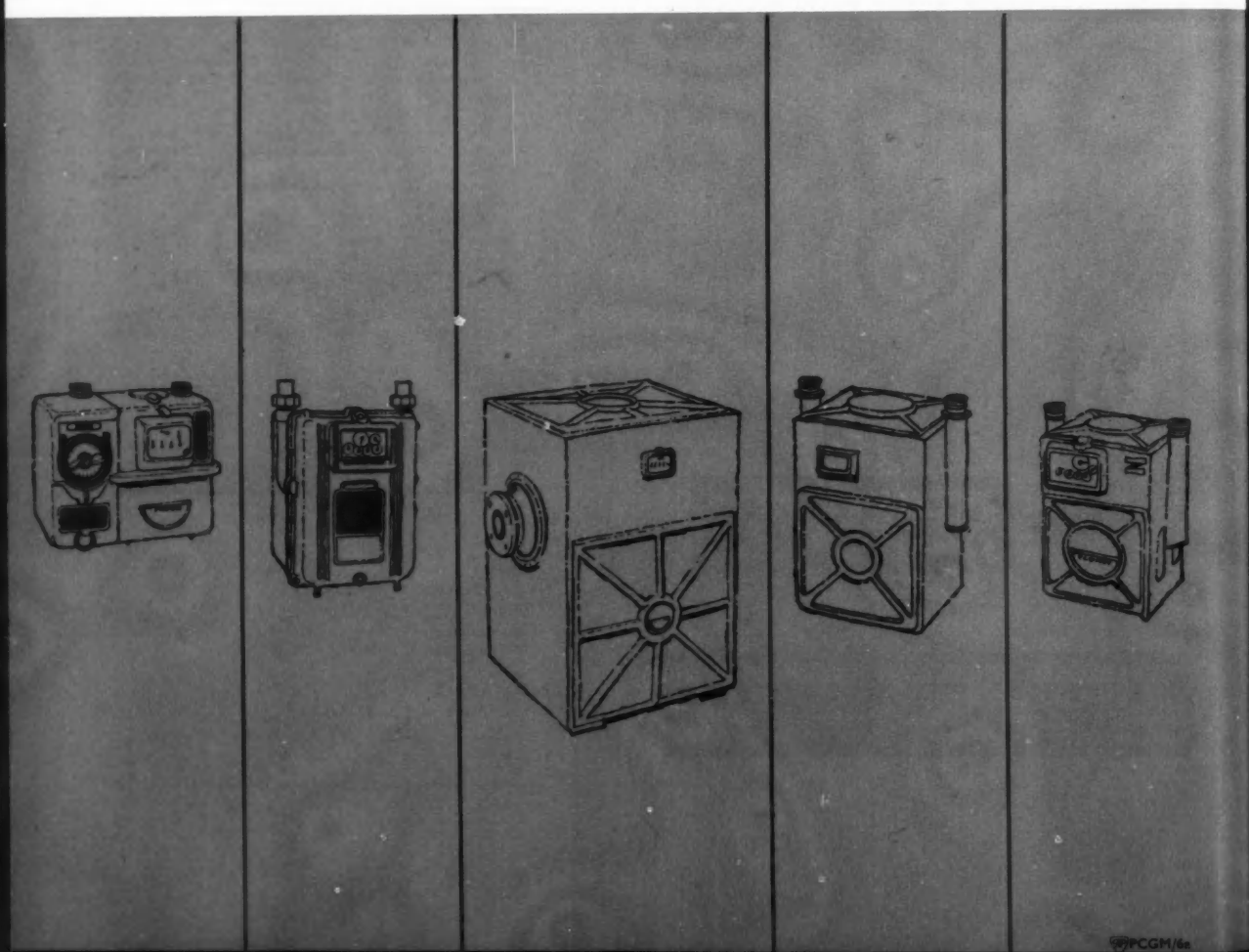

Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Another rescue bid for coal

WE have always been in favour of a freedom of choice of the fuel to be used by any class of consumer, either domestic or industrial. We consider that the industry is likely to gain more than it loses by such a policy, which has always encouraged keener salesmanship and improved engineering practice throughout the industry. Even so all will agree that the price of gas is too high to compete on completely equal terms with other refined fuels, and that it is by its inherent advantages in other directions that it is holding its own and periodically makes perceptible inroads into competing industries' sales.

In consequence the political repercussions of an official fuel policy by the Government are of profound importance to the industry, since, pushed to its logical conclusion, this freedom of choice must cover the fuels it uses as raw materials in gas-making every bit as much as those the industry competes with in the fuel markets.

The determination of the Opposition to compel the Government to reconsider its views on a national fuel policy was once more made manifest in a debate in the House of Commons last week during a Committee of Supply debate for the Ministry of Power.

Many of the arguments put forward with skill, reinforced by ample statistics, we have heard before, but it seemed to us, reading this particular debate in Hansard, that an exceptionally strong team, each member of which had personal experience of the mining industry—and many were ex-colliers—had been put into the field to hammer home the case of coal versus oil.

Mr. R. Gunter (Labour Southwark), opening the debate, referred to the use of atomic energy as a basic source of energy, and pointed out how very inadequate a source this was likely to be in the immediate future. In ten years time it might provide 1% of the total energy needed throughout the world, and according to the U.S. Atomic Energy Commission, about 15% of industrial energy by the year 2000. The increase in fuel demands appears to be being met by oil and natural gas, the resources of the latter being perhaps smaller than any other fundamental source of energy.

Since known coal resources in this country and throughout the world greatly exceeded oil and gas resources, said Mr. Gunter, it seemed foolish to jeopardise the future by neglecting our own coal when the enormous increases in demand for oil as the under-developed countries became industrialised, might well exhaust oil supplies by the end of the present century. He appealed for the wise planning of our coal reserves which should be guarded as one of our most important national assets. In the face of the closing down of 136 pits since 1957 and a reduction in manpower of 130,000 there seemed to be a danger of the mining industry losing ground by a decrease in demand for coal which would lower its prestige as a career for young men about to enter industry. Mr. Gunter wanted a minimum set for the coal to be consumed in the country. Any energy requirements above that could be found from other sources.

The Minister of Power, Mr. Richard Wood, pointed out that such a policy would mean some restriction on the consumption of certain fuels, which he thought would inevitably lead to higher energy costs, the necessity to impose some sort of control on consumption, and the transfer of the responsibility for both long- and short-term plans and the main commercial and industrial decisions to the Government. The Minister thought that to be effective such production targets should be fairly high and, although Mr. Gunter had suggested their yearly review, they should not be altered very often. Mr. Wood did not in fact think that such targets were the solution, but rather an improvement in the coal industry's efficiency by the Board's present programme of mechanisation, an improvement in output per man shift, and a continued effort to cheapen costs of production. Any form of protection would ultimately spell disaster since it would fatally sap the mining industry's competitive power.

Colonel Lancaster (Conservative, South Fylde) commented on the large staff necessary to administer the Board from Hobart House, amounting to 4,000 individuals, equivalent to 3s. 6d. for every ton of coal raised —'breathing down the necks of management in the provinces who are producing the coal.'

Mr. G. Nabarro (Conservative, Kidderminster) said that three matters urgently demanded the attention of Mr. Robens, the new Chairman of the Coal Board. Drastic economy must be enforced at Hobart House, the power and spirit of the colliery manager must be

restored, and the profit-making habits of private industry should be instilled into the Board in place of bureaucracy. He also asked what the Coal Board was doing about the deficiency in smokeless fuel needed for the 'black' areas of the country. He understood that large quantities of smokeless fuels would shortly appear of a type which had been affectionately referred to as 'Bronowski bullets.'

Mr. N. Pentland (Labour, Chester-le-Street) said that he and his colleagues were convinced that a plan for the development of coal, gas, electricity and nuclear energy would have to be put into effect. A policy for the co-ordination of all the fuel-producing industries was needed for which the Cabinet would have to accept full ministerial responsibility.

Mr. W. Blyton (Labour, Houghton-le-Spring) spoke at some length specifically about the difficulties facing the gas industry and drew a comparison between its slow growth in the last few years and the rapid increase in demand for electricity. Gas, he said, was technically a most satisfactory form of fuel, but any great increase in its use depended on a reduction in its price, and so its costs of production. This did not seem possible with the existing process of carbonisation so the industry would have to adopt an alternative process of complete gasification or the importation of natural gas in some form. He thought that the interests of coal and the nation would be better served by the former.

He referred to the North Thames Gas Board's scheme for importing 38,000 mill. cu.ft. of gas a year from the Sahara and its effect on the coal industry. He blamed the Government's conception of lively competition between the nationalised industries on the Gas Council's tendency to desert coal for other gas-making materials with a reduction of the present 65% of gas made from coal to 55% by 1966.

Mr. J. C. George (Parliamentary Secretary to the Minister of Power) assured the House that when any scheme for the importation of methane was put before the Minister, the National Coal Board would be consulted and any decision taken would be the best in the national interest. In the meantime the Gas Council were carrying out an investigation on the cost of Lurgi gas. The Lurgi plant at Westfield was now producing gas and a second was under construction. The plans to build these expensive plants showed an earnest desire on the part of the industry not to desert the coal industry. If it was to retain the domestic consumer—the backbone of the gas industry—it must find means of stabilising the price, and the use of other gas-making materials and processes was a means of keeping the industry healthy and in good heart. It must face realities.

It has always been our view that as far as possible the gas industry should make the greatest use of indigenous raw materials, but its present outlook towards the use of coal has been forced upon it from outside. This has perhaps had the merit of sharpening its incentives for cheaper gas production, but the delays entailed in bringing these new processes to full development might bring about a dangerous state of lethargy which in no way represents the actual state of the industry today.

Framing a degree course syllabus

A VEXED question among educationalists and industrialists is what those young men aspiring to enter industry should be taught at the university. The institutions in their role as guardians of the professional standards of their members, must clearly have a pretty important say in the matter, since on the passing of their qualifying examinations must depend the sucessful outcome of the potential engineer's professional career.

It was particularly interesting therefore to study a paper by Professor R. Edgeworth Johnstone, Lady Trent Professor of Chemical Engineering in the University of Nottingham, read to the Institution of Chemical Engineers last month.

It would appear that Professor Johnstone is in process of planning a new chemical engineering course at Nottingham University, and is understandably anxious that it should be as up to date as possible and present to the students a realistic, well-balanced syllabus which will enable them to carry out their professional work efficiently.

In order to do this, and with the full consent of the Institution of Chemical Engineers, he sent to each corporate member and graduate a questionnaire asking them to tick any of 24 sciences and techniques used by them in the course of a week. Each subject, if ticked, was to be marked if used once or more than once.

The response appears to have exceeded Professor Johnstone's most sanguine hopes, for he obtained returns from some 71% of all those circularised, the greatest response—74.4%—coming from Associate Members. The returned cards were mechanically sorted and the results carefully studied. The main task of the paper was to present the statistical results of the survey and to indicate the academic conclusions that might be drawn.

It seems that perhaps for the first time definite evidence is forthcoming as to the exact kind of techniques with which chemical engineers, at any rate, should be equipped to do their job successfully. Hitherto it has been experience, judgment, or even far-sighted appreciation of present trends, that has helped the university authorities to frame their syllabuses. In future Nottingham University will have definite facts to go on.

Our own industry, aware of the need of the engineer to be a man of personality in addition to his technical qualifications, should see that its training programme too is based on a similar analysis.

From a paper read to the Yorkshire Junior Gas Association at Wakefield.

Rodding control and trunk feeds

By R. SKILBECK, A.M.I.GAS E.,

SENIOR TECHNICAL ASSISTANT,
NORTH EASTERN GAS BOARD, HUDDERSFIELD.

MODERN practice, throughout industry, is to reduce the amount of physical effort required to carry out a given function and to reduce greatly any unpleasant conditions associated with this function. Any industry not making an attempt to reach this goal cannot, except by the enticement of an extremely large pay packet, hope to obtain the type of labour it requires.

In the gas industry, the advent of the continuous vertical retort, in itself, tended towards this practice. Vertical retorts came into existence in the early 1900's, and, since that time, various modifications have been made to the heating system, mode of extraction and the retort profile. However, the basic principle of feeding coal in at the top of the retort and extracting coke at the bottom, with rodding as an integral part of the process, has still remained.

At Huddersfield and at many other works too, the retorts have been rodded hourly to the manufacturer's recommendation since the retort house was first put into operation; any retort not having taken its full quota of coal receiving more intense rodding. It can be seen that, by this system, retorts may have ceased to travel regularly for periods of almost an hour, while at other times retorts may be rodded unnecessarily with the obvious waste of effort.

Scientific basis sought

In recent years some attempt has been made to bring retort rodding on to a scientific rather than a 'rule of thumb' basis. It follows that, unless a retort actually requires rodding once an hour, any such system must save some physical effort. Retort rodding control supplies this method but cannot affect the number of roddings required by any particular retort; it can only indicate which retorts require rodding. If, however, the coal can be made to travel more evenly through the retort, then the number of roddings required can be reduced; this is the function of the trunk feed.

The plant on which these tests were carried out, consists of two benches of lambent heated Woodall-Duckham continuous vertical retorts, each containing 24 retorts of 82-in. major axis.

The retort rodding control has been installed on No. 2 bench, which commenced gasmaking in November, 1958.

No. 1 bench was put to work in 1949 and has had resets, the first 12 retorts in 1955 and the other 12 in 1957.

All the retorts on No. 1 bench are of the continuous taper type and those on No. 2 bench double taper type, and, until the modifications described in this paper were carried out, were of standard design.

It has been known for many years that when the coal travel through a retort ceases or slows down, the temperature of the gas passing through the retort offtake rises. A system installed at Birmingham makes use of this fact to give a warning of the increased gas temperature and that the retort requires rodding. In view of the results obtained at Birmingham, the North Eastern Gas Board decided that the installation of a similar control device on the new bench of continuous verticals at Huddersfield, might be a valuable and profitable experiment. It was hoped that, if the results at Huddersfield proved satisfactory, it would be economical to install further retort rodding controls on other benches of continuous vertical retorts. After preliminary talks with the Trade Unions, the order was placed for the equipment. The installation was completed in late April, 1959.

The retort rodding control consists of a set of thermocouples, recorders, alarm lamps and audible alarms. There are two sets of equipment, contained in the same panel, to a bench of 24 retorts.

It was put into operation on April 30, 1959, but hourly rodding continued until some observation of the gas offtake temperatures had been made and a suitable upper alarm limit could be determined. Over a period of about a week the temperatures were observed, and it appeared that when the offtake temperature reached 275°C. a retort could reasonably be assumed to require rodding. The alarm temperature was, therefore, set at this figure, and roddings were carried out when the alarms indicated. After a period of eight weeks the alarm temperature was reduced to 250°C. and then two weeks later, increased to 265°C., at which temperature the alarm is still operating.

At Huddersfield some of the stokers initially did not like retort rodding control, and indeed, during tests great difficulty was encountered in compelling them to work to it when it was evident that a retort was going 'sick' and no indication was being shown on the equipment. However, it seems to have been accepted and trusted now. It should be noted that the Birmingham installation is coupled with an incentive bonus scheme, thus, naturally, the stokers' attitude at Birmingham was rather different.

Individual treatment

Our results at Huddersfield do not compare closely with those at Birmingham. Each installation must, however, be treated individually since the temperature of the gas passing to the retort offtake varies, not only with the coal travel but also with the actual coal. During other tests carried out it was possible to observe the offtake temperatures of four retorts working first on Sharlston and then on Crigglestone coal. During normal working, the offtake temperature band when carbonising the Sharlston coal (swelling No. 3) was found to be in the range of 90-150°C., while the Crigglestone coal (swelling No. 6½) gave a temperature range of 150-230°C. It is not within the scope of this paper to establish reasons for this, but only to say that it does actually occur.

The other factors which, in normal carbonisation, are known to influence rodding and also have an effect on the retort offtake temperature, are the temperature in the top pass of the retort, the throughput and the steaming rate. The top temperatures on the whole bench were raised by 30°C. and, two days later, three retorts were top hanging; these retorts were emptied and recharged. After this settling down period no further hanging occurred and the number of roddings returned to normal. The effect of reducing the throughput by 5 to 6% over a period of four days, was to increase the number of roddings by 40 to 50%. However, the throughput was stabilised at 4% below normal and the number of roddings then fell to the same level as at the former throughput. No observations have been made on the effect of the steaming rate.

Four trunk feeds

In the light of the reports in the technical Press, of improved coal travel obtained with trunk feeding, four trunk feeds were purchased from the Woodall-Duckham Construction Co. Ltd. Two of these were installed in Nos. 26 and 36 retorts on No. 2 bench in April, 1959. The fitting of these trunk feeds was found to be an unpleasant and arduous task, necessitating the removal of the existing deflector plates, and the bolting within the top of the retort new ironwork on which the trunk feed rests. Some thought, therefore, was given to a design which, besides being far less costly, could eliminate the special fittings required with the W-D type.

It was decided that the Huddersfield type of trunk feed should fit very closely between the existing deflector plates to avoid coal wedging between the trunk feed and the deflector plates. It was thought that this coal could make removal of the trunk feed difficult. To enable it to be of sufficient width it was necessary to make it in two halves which could be locked after setting in position. The locking device consisted only of a hook on one half and a plate on the other, over which the hook fitted. This type of trunk feed, fabricated from ¼-in. plate, was designed to rest on a bar supported by the existing deflector plates; it was known as a heavy gauge trunk feed.

Two platers and their mates took 16 working hours to fit the first W-D trunk feed, but the fourth trunk feed took the same four men only six hours; by the time the remainder of the retorts were modified, the average time taken was down to four hours per retort.

Shortly afterwards the heavy gauge trunk feed was fitted into No. 48 retort and the short deflector plate, on the non-offtake side of No. 37 retort, was made the same length as the plate on the offtake side. When, however, it was to be removed from No. 48 retort at scurfing time, chain blocks were required to lift it, mainly because of its own weight.

It was replaced by one of lighter gauge plate, ½-in., and further light gauge trunk feeds were fitted in Nos. 27, 38 and 39 retorts. Records kept of the number of roddings carried out on these retorts at various temperatures on the retort rodding control showed that No. 37 retort with the long deflector plate, had no advantage over the standard retorts.

The light gauge trunk feeds required only slightly less rodding than the standard retorts. On removal, they were all found to be warped, and the poor results obtained were believed to be due entirely to warping.

The W-D trunk feeds, on the other hand, showed up to advantage. When off for scurfing, there were no difficulties in their removal, and none, when removed, was found to have any deposit of appreciable size adhering to it.

An analysis of the number of roddings carried out on each retort showed that Nos. 32 and 43 had the worst records, with averages of 43% and 42.7% respectively, so W-D type trunk feed was fitted into No. 43 retort and a trunk feed made to the W-D pattern was fitted in No. 32 retort. This latter feed had been modified by fitting a strip of ½-in. by 1-in. flat bar along the bottom to prevent warping. If these retorts were 'cured' by the W-D type trunk feeds it might be advantageous to extend the use of this type.

The percentage roddings on Nos. 32 and 43 retorts dropped from 43% to 12%, and a summary of the results of further tests gave a percentage rodding on W-D type trunk feeds as 15% and that on standard retorts as 34%. In both cases the retorts were rodded only to the indicator lights. The most marked effect of trunk feeds was on the coal travel. Consequently an order was placed with the Woodall-Duckham Construction Co. Ltd. to supply a further 42 trunk feeds complete with top fittings.

The fitting of the W-D trunk feeds to the remaining 42 retorts presented a somewhat difficult problem. The retorts had to be modified by May 1, 1960, in order that the agreement concerning the subsequent manning of the retort house could be fulfilled. The men so released were needed to supply the extra manpower required by the introduction of the 42-hour week.

Unfortunately, the feeds were not delivered until April 22, so 42 retorts had to be modified in 10 days, and this included shutting off, emptying and recharging the retorts. It was decided that a maximum of 12 retorts could be off gasmaking at any one time, *i.e.*, four retorts would be taken off each day and, after standing empty for a day, would be modified and then recharged two days after emptying. The schedule to be worked was to fit four trunk feeds each day from Sunday, April 24, leaving 10 retorts unmodified, and these retorts were to be left empty until modified.

Previous work, on the fitting of this type of trunk feed, suggested that four platers, the carbonising foreman and two labourers would be sufficient to carry out the schedule. However, on the first day only two retorts were completed. A great deal of time had been wasted by the top casting plates having to be drilled, and the trunk feed fittings having to be cut to the correct size. The size of the working party was, therefore, increased to four platers, the carbonising foreman, four labourers and a welder with an additional apprentice and labourer working part time taking all the top casting plates up to the mechanics' shop, drilling them and returning them to the retort house.

Average maintained

On the second day six retorts were completed and this average was maintained through the remaining six days. By May 1 only three retorts remained to be modified and these were completed that day. We were, in fact, 11 retorts ahead of schedule, and a great deal of praise must be given to all who worked on this extremely arduous operation.

As a matter of general policy, all concerned have been kept fully informed at each stage of development, and discussions have taken place from time to time with the shift supervisors, stokers and the shop steward regarding the results obtained and the future programme.

Following the introduction of trunk feeds and appropriate discussions, manpower requirements have been modified and no additional men were needed in the retort house on the introduction of the 42-hour week.

The results obtained from fitting the trunk feeds may be summarised as follows:

The average throughput, in the weeks prior to fitting the trunk feeds, was 7.3 tons per retort per day and, without any increase in the extraction rate, this figure rose to 8.4 tons after the trunk feeds were installed.

The average throughput since the trunk feeds were installed has been 8.51 tons per retort per day, which includes a period of about five weeks during the summer when the throughput was only 8.2 tons per retort per day. During three weeks in December the average throughput was 8.64 tons per retort per day, and it is expected that this average will be maintained, or even exceeded, through the remainder of the peak demand period.

It is essential that, when working at these high throughputs, the retort temperatures should be maintained at the maximum level to ensure complete carbonisation.

The nominal output of the setting is 5.63 mill. cu.ft. per day. During the peak demand period an average of 6.42 mill. cu.ft. per day, with 5% scurfing, has been achieved, and on two successive days outputs of 6.83 and 6.77 mill. cu.ft. were obtained.

The carbonising results during the period since the installation of trunk feeds seem rather misleading. The thermal yield of gas per ton has shown a decrease of .50 therms, but this is clearly attributable more to variations in the coal carbonised than to the trunk feeds, since over a period of eight weeks the therms per ton were .65 therms higher than before trunk feeds were fitted.

The tar yield, as expected, has decreased from 16.6 to 16 gal. per ton since the installation of the trunk feeds. This is probably due to the greater gas space altering cracking conditions at the top of the retort. This approximates to a reasonable tar yield under good conditions, inferring that no overcracking is taking place. The coke yield has shown a very slight increase of .02 cwt. per ton.

From all the results obtained:

1. It is evident that retorts do not require rodding hourly.
2. The installation of retort rodding control is advantageous providing that its limitations are realised and the expenditure can be justified. It can be put to its best use in the following cases: (a) On a large works when a full bench could be fed on a particular coal for long periods, in which case the alarm temperature could be set to very fine limits, and (b) where an incentive bonus scheme is operating as at Birmingham; in which case a positive record of the number of roddings is necessary to establish the fact that a retort actually requires rodding.
3. The maximum coal throughput can only be achieved by the use of trunk feeds.
4. The minimum rodding can be obtained by the use of trunk feeds coupled with retort rodding control, or with the standard W-D coal travel indicators.
5. The trunk feeds installed in Nos. 26 and 36 retorts have been in operation 21 months and have shown no undue signs of wear. An occasional trunk feed has been found to be burnt away quite appreciably, although it has not been necessary to replace any to date. The home made trunk feed fitted into No. 32 retort is still in good condition after 15 months of operation.
6. We at Huddersfield are firmly convinced as to the success of the installation of trunk feeds in continuous vertical retorts.

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from a paper read to the Midland Junior Gas Association.

The use of steel pipelines in terrain liable to subsidence

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THE gas industry's present distribution practice is, in general, to limit the use of mild steel pipes to those pipelines which will operate at relatively high pressures. However, in the Stoke-on-Trent and Newcastle-under-Lyme districts of the North Staffordshire Division, it is the practice to lay mild steel pipes for operating at both low pressures and higher pressures.

The surface effects of coal mining operations are experienced, and have to be guarded against, almost everywhere within the boundaries of the City of Stoke and the Borough of Newcastle-under-Lyme.

The effects of ground subsidence on a pipeline will depend upon the magnitude of the total subsidence, the rate at which it occurs and the number of subsidence cycles. Its destructive powers will be aggravated by uneven subsidence, by changes of the pipe either horizontally or vertically, by the presence of branches, junctions, valve chambers and by excessive depth of cover. The pipeline may be called upon to suffer:

1. Severe longitudinal (axial) bending tending to rupture it transversely.
2. Possibly severe crushing overloads tending to rupture it longitudinally, or to cause buckling or even complete collapse.
3. Considerable axial lengthening and shortening tending to cause drawn joints—especially at bends, branches or valves—or axial buckling or crushing, upheaval or broken sockets; their effects being aggravated by local resistance to sliding caused by projections beyond the pipe barrel, or other anchorages.
4. Severe transverse shear forces.

The manner in which a pipeline responds to the various movements and forces to which it is subjected will depend on: (a) The strength, thickness, and flexibility of the material used for the pipe wall, (b) whether the pipe itself is flexible or depends for its flexibility on flexible joints, (c) the spacing of flexible joints where these are used and their ability to accommodate displacements of the pipe

in any direction, and (d) the degree of axial anchorage, if any, imposed on the pipeline.

To meet the special conditions of loading imposed on a pipeline by ground movement, the order of preference of the material is, disregarding corrosion resistance, 'flexible,' 'semi-rigid' or 'rigid.'

The principal disadvantages of laying mild steel pipes in comparison with spun iron pipes are: (a) The higher cost of mild steel pipes, and (b) the apparent increased rate of deterioration of mild steel pipes due to corrosion. The first disadvantage is only valid where site conditions and operating pressures do not preclude the use of spun iron pipes.

External protection

In general, where mild steel pipes have been laid, they have been externally protected with a sheath of bitumen with asbestos fillers included, or with a reinforcement of the bitumen sheath by hessian bandage. Irrespective of the pro-coal tar and pro-bitumen schools of thought—and the claims of both should not be underestimated—there is ample evidence for the claim that, providing the bitumen sheath remains intact and that it does not contain organic material to produce a 'wick' effect, the bitumen affords an excellent anti-corrosive protection for the mild steel. The weakness of the original sheathing was its inability to withstand damage from stresses and impact. When reinforced with hessian bandage, the 'wick' effect of the hessian, and the presence of organic material to accelerate the action of sulphate reducing bacteria, completely nullified the advantage gained from the 'hoop' strength which the bandage gave to the sheathing.

The factory-applied sheathing now available on mild steel pipes provides a far superior external protection. The bitumen sheathing, reinforced with woven glass bandage, has the toughness to withstand damage from impact; even a relatively severe impact invariably only damages that part of the bitumen sheath external of the reinforcing bandage. The manufacturers now supply a mild steel pipe with an external protection of high quality.

Providing the mild steel pipe is placed in the ground without damage to the sheathing and reasonable care is exercised in the backfilling, a long life protection of the pipe against corrosion can be confidently anticipated.

Suitable wide band slings must be used for lifting the pipes and the soundness of the sheathings must be assured by the use of a suitable 'holiday' detector. The instrument now used is the Elmed-Isotest.

Previously the instruments used were not sufficiently robust for field work, and were rather unwieldy. They required an experienced operator to differentiate between 'holidays' and coronary discharge, and when working in bright sunlight making observation of the spark difficult. The brush headed probe also left much to be desired.

The Elmed-Isotest detector has a non-ferrous metal coil spring probe and the presence of a 'holiday' is signalled by the ringing of a bell.

For major pipeline work there is a detector on site and all pipes are tested before placing them in the ground. To have a 'holiday' detector on each site would be impractical, so, in practice, all pipes are tested before issue from the stockyard to the sites, and sheathing repairs are carried out as necessary. Visual inspection of the sheathing is made immediately before laying and any observed defects repaired. This procedure is completely adequate.

Before mild steel pipes were available with the sheathing reinforced by glass woven bandage, it was our practice to bitumen mould the joints, and so provide at least the same external protection as that of the pipe. Clearly pipes with the new sheathing of increased toughness and improved soundness demanded the same standard of external protection for the joint. The solution was not immediately apparent and several methods of affording external protection were tried, including available protective wrappings. These were rejected in favour of the double moulding technique, which was ultimately developed.

Initially, it was used on welded joints and required, immediately after welding, the normal cleaning of the weld and adjacent unprotected pipe, followed by the application of a bitumen primer coat. Two mild steel moulds are used, the one of smaller internal diameter being termed the 'inner' and the other the 'outer'.

The 'inner' mould is assembled and a run made of hot bitumen which gives a sheath over the exposed pipe surface. When the bitumen has cooled sufficiently, the mould is removed and the lime wash deposited by the mould, cleaned off. The end of a roll of glass woven bandage is then tacked, by a dab of hot bitumen, to the cleaned surface and wrapped, under tension around the surface of the 'inner' run. Tension in the bandage is maintained by again tacking with a dab of hot bitumen before cutting off the surplus roll. The 'outer' mould is then fitted and a further pouring made of hot bitumen. This second pouring dissolves the surface of the first run and the inner and outer runs, and the ends of the pipe sheathing become a homogenous whole, with the woven glass bandage positioned correctly to provide the required hoop strength. The completed moulding is extremely tough and affords protection as good as, if not better than, the pipe sheathing.

Criticisms have been made of the inherent slowness of affording the protection and of the presumed, greater cost, over other methods used on factory sheathed pipes. The first can, within certain limits, be refuted. By running three 'inner' moulds on successive joints, and then returning to run successive 'outer' moulds, thereby allowing time for the first inner run to cool, one man can in a day protect as many, say 12-in. joints as one welder can weld.

The cost, if higher than other methods, can be fully justified. This method of joint protection virtually eliminates the possibility of poor workmanship and inherent faults arising from it, and its ability to withstand stresses and impact equal to, and possibly better than, the high quality factory applied pipe sheathing, fully vindicates the use of this method of joint protection.

May be penetrated

Though it is possible to have an external protection of high quality, efficiency and durability, that protection can be penetrated by a sharp, hard object, particularly if this object is compressed against the sheathing over a considerable period of time; in other words, under those conditions likely to be met in the pipe bed and backfill.

Great care must, therefore, be taken to ensure that the bed and backfill immediately surrounding the pipe is devoid of stones, shale and other hard materials, which, during backfilling or subsequently, could be compressed into the sheathing and eventually break down the external protection of the pipe at random points. As a minimum the excavated material must be free of hard objects, and the material comprising the bed, and backfill around and to six inches over the pipe, must be riddled to remove stones and other hard objects.

Pipes laid in a subsidence area must have a bed and backfill of uniform material for the whole length of the pipeline to prevent or reduce the formation of 'hard spots' which have a detrimental effect on the pipe loads resulting from disturbances of the pipe bed. In the Potteries material obtained from excavations is rarely free from hard objects. Excavation over any reasonable length under varying

ground conditions, if used for bed and backfill, would result in the formation of 'hard spots'.

In this area, therefore, the practice is to lay pipes on a sand bed of two to three in. thickness, and backfill with sand to cover of 6 in. over the pipe. The sand used is from a local source, but before deciding on the quality, three samples were analysed and later tested for the presence of sulphate reducing bacteria. From these latter tests it could be determined what percentage of chalk should be added. Samples of various grades of chalk were also examined. The result of these tests indicated that 'medium waste' sand with the addition of 1 cwt., of ¼-in. chips of limestone Grade 0 to every 5 tons load of sand, would be satisactory.

It may be argued that the cost of 'sandfilling' could only be justified for a pipeline in a mining subsidence area where the uniformity of bed and backfill material are of importance. But is this argument generally valid? Where the backfill material is such as to require riddling, considerable costs result and when completed, it is very doubtful if the corrosion inhibiting quality of the material surrounding the pipe approaches that of the sand backfill. With sand as a backfill, the material surrounding the pipeline is uniform, free of hard objects and non-aggressive.

Internal protection

The internal protection of the pipeline is also important. As generally supplied today, pipes are descaled, phosphate treated and internally coated with red lead paint. This internal protection with red lead is good and does provide adequate protection providing it is correctly applied, but it is not the perfect protection. The method adopted by the manufacturers for the application of red lead to the pipe bore must ensure that the protective coating is uniform and of adequate thickness. This, however, has not always been so for all pipes received, and red lead coatings have shown visible signs of breaking down after only 12 months in service. The reason for these unsatisfactory coatings seems to be the hard texture of the bristles of the brushes used to apply the red lead, causing 'bristle lines' in the coating. When referred to the manufacturers, they immediately took steps to eliminate the cause of the complaint. Their action will have been entirely successful when the internal protection of all pipes received is consistent with the apparently adequate and satisfactory coatings applied to those of larger diameter.

The problem, however, is how to remedy the destruction of the internal protection at the joint caused by electric-arc welding. There is an almost complete destruction of the red lead coating over a band width of 2 in. to 2½ in. and partial destruction extending ¼ in. to ½ in. from the band boundaries towards the spigot end of the bore, and 1 in. to 1½ in. in the opposite direction.

There are two types of joint used on steel pipelines laid in the Potteries coalfield area. They are (a) a spigot and socket joint for external electric arc fillet welding, used on all major pipelines, whether for low or medium pressures, and for all medium pressure pipelines with a maximum pressure 20 p.s.i., and (b) the Drees spigot and socket glanded joint for all other pipelines operating at low pressures.

The continued use of the socket and spigot joint with fillet weld may be questioned in view of the current trend to use 'sized' spigots with butt welding. The reasons for doing so, though they may not be valid in the face of specific argument, are (a) that the spigot, metal bound in the socket, presents the continuous flexibility of the pipe wall to transverse loading imposed by ground stresses, (b) that the higher quality of the butt weld is only necessary where the operating pressures of the pipeline demand this type of weld, along with the high quality of weld inspection by gamma ray or other means (c) that the spigot and socket pipes are simpler to lay and weld in all but those conditions which lend themselves to 'spread' pipelining techniques, and (d) that the socket and spigot joint with a fillet weld has proved itself entirely adequate for our requirements.

Personal experience has shown how extremely rare fillet weld failure is from tearing or cracking of the weld, even after a lengthy period of service. Invariably such failure has been caused by tearing or corrosion of the spigot at a point some ¼ in. to ½ in. away from the weld. Could such failures be due to stress corrosion caused by thermal stress attributable to welding? Much more information is needed about this, and also of the possible effects on the adjacent metal from fillet or butt welding.

The joint used in the Potteries for mild steel pipes operating at low pressures was, until recently, the spigot and socket type with caulked lead wool as the sealing medium. In principle, this joint is very suitable in a mining subsidence area. The 6-in. or 7-in. insertion of the spigot in the socket provided the continuity of the strength and flexibility of the pipe walls to accommodate bending stresses. The ability of the joint to allow partial strength and flexibility of the pipe walls to accommodate 'stretching' of the pipeline without causing any serious defect. It does, however, possess one bad fault. Spigot withdrawal, of as little as ¼ in., invariably results in an escape of gas from the 'drawn joint.' Though only of minor proportions, such escapes of gas require location, excavation and 'making good' by re-caulking or re-making the lead wool seal.

To overcome this fault of lead wool joints, a sealing medium must be found which would accommodate considerable spigot movement without leakage. The replacement of the lead wool by a rubber gland ring was an obvious solution, and our ideas were put before Stewarts and Lloyds Ltd. Eventually a prototype incorporating the Johnson coupling principle of jointing was arrived at, and tests proved the design principles of this prototype to be sound. Transverse stresses could be accommodated by the metal bound spigot and socket, and a withdrawal of 3¼ in. could be effected, even with transverse stresses applied before the joint failed; initial failure was by a leakage of minor proportions.

The Drees joint

With the principle established, the result of further talks with Stewarts and Lloyds Ltd. and tests on prototypes eventually produced the Drees joint. It gets its name from an identical form of a joint first made by Stewarts and Lloyds Ltd. in the early 1920's. This had passed into disuse after only limited application, probably because the sealing had been effected by compression of graphitised asbestos cord.

For the new Drees joint pipes have parallel spigots, while the sockets have a taper of a few thousandths of an inch over their length, and allow a depth of spigot entry into the socket of 6 in. to 7 in.

In practice the joints are assembled with the spigot withdrawn 1 in. to accommodate, at the worst, most of the expected contraction of the pipeline. Sealing is effected by a shaped rubber gland compressed against the bell mouth of the socket and the spigot by a gland plate or flange. This in turn is forced against the gland by nuts on bolts passing through a securing flange behind the socket. The joint is simple to make and has been as satisfactory on the test rig as the prototype previously described.

Pipelines fitted with this type of joint have successfully

passed a 50-p.s.i. soundness test to I.G.E. recommended tolerances. Stretching of the pipeline can be accommodated by spigot withdrawal of 2 to 3 in. in each joint. The partial contraction which often follows the stretching, *e.g.*, from the effects of a subsidence wave, will be accommodated by re-entry of the spigots into the sockets. The test results point to all such spigot movement taking place without leakages occurring.

The Drees joint should therefore be entirely satisfactory in all but extreme cases of stress, and in the long term mean a progressive saving estimated as approximately £680 in 1970 and £1,360 in 1980.

Withdrawal tests made on Drees joints protected by the double moulding method show that a 2½-in. withdrawal of the spigot can be made before the mould began to show any signs of failure. Although the bitumen 'double' mould for the permanent protection of a joint subjected to repeated spigot movements may not provide the ideal durable external protection, until further experiments provide a better solution, this method of protection will be used.

Resistance to sliding

The effects on a pipeline subjected to ground stresses from mining subsidence are aggravated by local resistance to sliding due to projections beyond the pipe barrel, or other anchorages. The conventional design of syphon used for mild steel pipelines, however jointed, was found to be the source of considerable trouble.

Either the syphon was crushed, often severely enough to cause the wall of the syphon body, or pot, to collapse so completely that the walls met, or the socket branches welded to the main body of the syphon were torn away from the body; this occurred specifically to weld jointed pipelines. Clearly it was not possible to design a syphon which did not project beyond the pipe barrel, so the problem was how to eliminate, as far as possible, the anchorage effect of such projections on the pipeline, and how to continue, unbroken the strength of the pipeline through the syphon.

Work began once again on prototypes, with the basic idea of making a 'cocoon' or 'blister' around a length of pipe. Such a design would, at least, give the desired continuity of pipe strength through the syphon. The design of the 'cocoon,' however, gave a little more trouble. After fabricating from pipe of a larger diameter than that of the pipe through the syphon, it was shaped like a metal canoe. When placed in position, at least it possessed no awkward projection, but could anyone be reasonably asked to make such a syphon? Stewarts and Lloyds Ltd. were approached. Once again they gave their full co-operation and submitted a feasible design for manufacture which has the basic advantages of the 'canoe' without the manufacturing disadvantages. This syphon is now incorporated in all our welded pipelines and the major Drees jointed pipelines. It maintains the continuity of the pipeline through the syphon, and the tapered ends of the syphon body have eliminated as much as possible any anchorage effects.

Except where absolutely necessary valves are not installed in pipelines, especially welded pipelines. This is to avoid the anchorage effect of a valve and the resultant heightened susceptibility to fracture of the cast iron body of the types of valves most generally available. Where such cast iron valves have been installed the space all around the valve, for some distance beyond its flanges, and to the same height as the valve have been backfilled with sand. Nevertheless such valves are considered a weak link, and our future policy will be to install, where they must be included in welded steel pipelines, valves with cast steel bodies.

All valves installed have a copper tube extension from the greasing points on the valve body to a position in the surface cover box to facilitate lubrication. A copper tube by-pass is also included as a provision for the maintenance of 2-in. w.g. pressure across the closed valve during cutting-out operations as recommended by the Distribution Committtee of the I.G.E. We do not build valve chambers as these are considered extremely undesirable.

Our current practice for taking branch connections from existing 'live' steel pipes is to weld on the connection. If it is nearly equal or equal to the size of the 'live' pipe, a weld-on tee is used, fitted with a damper plate for low pressure, or a valve for medium pressure mains. Where the branch is of considerably smaller diameter than the 'live' pipe, a weld-on branch is used. The tee or branch is electric-arc welded to the 'live' pipe and air tested for soundness before mounting on the branch flange an air or hand operated under-pressure machine and drilling the 'live' pipe.

Some form of positive flexibility might be thought necessary when connecting service tubes to mild steel pipes in a subsidence area, but the disadvantages to be found in the methods so far adopted, has shown that such a provision is hardly necessary. The flexibility of the service tube itself and allowing it some movement by eliminating any anchorage to the footings of the property, have proved to be a completely satisfactory solution.

Although making a service connection to mild steel pipe by an expanding nipple is reasonably satisfactory, tests are to be carried out on a weld-on tee.

This method should have two distinct advantages in being able to provide a better connection to the steel pipe than the expanding nipple, and making it possible to test the service for soundness as is done for flexible connections for services from a cast iron main. The tee is welded on, followed by laying the service complete; the test pipe and U-gauge are assembled on the tee, and an air soundness test is carried out. If satisfactory, the test pipe and gauge are removed, a drill assembled on the tee and the steel pipe drilled through the body of the tee. Clearly for economic reasons the use of the weld-on tee would be confined to sites, *e.g.*, housing estates, where several tees can be welded on during one visit of the welder.

The use of external risers and the entry of the service direct to the meter by a duct through the external wall of the property eliminates any anchorage to the house footings. The annular space in the duct is sealed throughout its length by a compound which retains its plasticity.

This method ensures the minimum length of uncontrolled service within the property; the absence of anchorage and the allowance for movement of the service, has, except in extreme cases, been found to be entirely adequate and to provide the optimum safety.

DISCUSSION

Mr. B. G. H. J. Hawkins, Junior Vice-President, Coventry, said that where mainlaying was concerned, there was still an attitude prevalent that mains laid were 'out of sight and out of mind' and accountants often queried the necessity to lay pipes at all!

The sheathing applied to pipes at the factory he had found to be good, but he drew attention to the rapid deterioration of m.s. service tube. He asked whether the welds were tested by gamma-ray or ultrasonic means, and if so, were the tests carried out before the joints were protected by the double moulding method.

Referring to the laying of mains in a subsidence area, Mr. Hawkings queried the use of limestone chips as part of the filling media, commenting that something with smaller particles would seem to have been preferable. He also asked what method was used to mix the sand and chips.

He also queried the use of lead wool for joints, since in his experience this material was difficult to cohere. Regarding the use of ceramic dust filters on steel pipelines, he thought that there would be some observable pressure drop and asked how these filters were cleaned.

Mr. Jones, replying, said that the external sheath protection of m.s. pipes was not the same as the sheathing on m.s. service tubes. The point he was trying to make was that various methods used in distribution work were the results of experience, and the opinions held by the engineers concerned. What was wanted was a national scientific research team to investigate all the various methods and to say which was the best.

Regarding fillet welds and the testing of them by gamma-ray or ultrasonic means, he understood that the testing of pipeline fillet welded joints could not readily be applied, but provided the welds passed the normal air soundness test, they should be satisfactory for a medium pressure pipeline. If there was a better method, he doubted whether it could be economically justified.

The President, **Mr. R. W. Nelson,** Birmingham, interposed to say that he believed that these welds could be tested, but whether such tests could be justified would depend upon whether they were on l.p. or h.p. mains.

Mr. Jones, continuing his reply to Mr. Hawkings, said that the limestone chips had been recommended by chemists, who he felt were better qualified to offer an opinion on the subject; the chips were mixed with sand by hand using a shovel.

He confessed that he was not happy about using lead wool for joints, but it should be remembered that lead wool joints were the most suitable joints then available for a mining subsidence area, and they had been reasonably satisfactory. Their use was now discontinued in favour of the Dree's glanded joint.

The use of ceramic dust filters was in the experimental stage, and it was hoped that cleaning might be achieved by reversal of flow through the filter. The major difficulty appeared to be the elimination of dust penetration into the ceramic filter element. Such penetration of any marked degree caused difficulty in cleaning by reversal of flow. Deposition of the dust in governor installations seemed to be due to the reduction in the rate of gas flow, and aim, therefore, was to position the filter in the gas stream before any such point of reduction in flow rate.

The President said that this was a point of interest to the Birmingham Division and asked whether the ceramic filters were an improvement on the screen filters, and were they not dearer than the latter.

Mr. Jones replied that he had tried many types of filters with no great success. The ceramic type were dearer, but if the cost of maintenance now necessary could be eliminated, then they would be worth the additional cost.

Mr. J. D. Cormack, Birmingham, said that few distributing engineers in the Birmingham Division had experienced the difficulties which faced their opposite numbers in the North Staffs. Division. Referring to the anchorage of bends in m.s. pipes used for h.p. gas, he asked how these anchorages were prepared, and whether tie bars were used.

As to the protection of joints with moulds, he felt that there must be a tendency for the bitumen to cool as it was poured into the mould, and asked whether it was not difficult therefore to get it to run into the bottom of the mould.

In connection with dust filters, he suggested that a solution to the dust contamination of governors might be to alter the design of the valve seats. Finally he confirmed the breaking down of the red lead coating at weld positions as being an important matter and asked whether Mr. Jones had had any experience of leakage at welds caused by this breakdown.

Mr. Jones replied that it must be remembered that the welded steel pipelines referred to were designed for a maximum operating pressure of only 20 p.s.i. At such a pressure no anchorage was considered necessary, indeed, the reverse applied, since in a subsidence area it was essential that fully welded pipelines should be 'free floating'. Stresses could then be accommodated, as had been proved in practice. Concerning the protection of joints by using moulds, the temperature of the bitumen was important and the mould itself was usually warm, and since the limewash was applied to the inner surface of the mould, it was hot-dried. There was no difficulty in the use of these moulds, provided these points were observed.

To test the soundness of a mould the method used was to 'sound' it by striking it with a hammer. Considerable force was needed to break the mould, and particularly so if it was required to remove entirely the protection applied in this way from the joint. He said that it would not be possible to alter the design of governor valves and seats to accommodate the large quantities of 'dust', which were removed from the governor at the frequent maintenance visits.

As to the breaking down of the red lead coating at welds, Mr. Jones said that it was not yet possible to judge the long term effect of this breakdown, since pipelines internally protected by red lead had not been long enough in service. Even so, leakage at a joint may be due to a number of reasons, and it would be difficult to relate this joint defect to the destruction of the red lead coating without conducting a series of detailed tests.

Mr. Owen, Birmingham, asked how the branch connections from 'live' steel pipes were protected and whether the space round the valve in the pipeline was also filled in with sand.

Mr. Jones said that the branch connections were protected by mastic, then mastic coated glass woven bandage with a bitumen backed bandage for the final wrapping; this was sufficient to ensure adequate protection. Experience had shown that the mastic affords excellent protection, the woven glass was a satisfactory carrier, and the external surface of bitumen gave protection against displacement of the mastic by abrasion caused by movement of the buried pipeline. The method was used for all 'awkward' contours.

As to the use of sand for the back-filling on valves, he agreed that there would be consolidation, but added that there was bound to be some consolidation whatever suitable material was used. The sand referred to in the paper was 'medium coarse' and in some cases grittier sand was used where drainage was required. He agreed that sand back-filled around the valves would not eliminate anchorage effect, and the best solution was that now adopted to install valves with cast steel bodies.

The President enquired whether Mr. Jones had had any experience of the fracture of c.i. valve bodies caused by stresses at the point of anchorage, and on hearing that he had, asked whether bracing was used to avoid such stresses being applied to the valve.

Mr. Jones replied that this had not been done, since he did not feel it wise to do so. Bracing had been considered, as had flexible couplings, but the latter had been rejected from considerations of safety. He pointed out that the difficulty would be to assess the magnitude of the

movement which might be experienced if flexible couplings were used; it would be necessary to restrict the movement of the spigot within the coupling.

Mr. J. Graham, Dudley, asked Mr. Jones whether he could say what the difficulties had been with the use of Torpedo syphons, and went on to ask whether there had been any dust troubles in the syphons caused by a change in the velocity of the gas. He also wanted to know whether there were any provisions for taking up the stresses in services such as the provision of lead loops.

Mr. Jones replied that the Torpedo syphon had not been in use long enough for him to encounter any difficulties which might be expected to materialise. He could, however, say that they had been introduced into new pipelines, and he did not consider that there would be the same 'dust' trouble as experienced in some of the old pipelines, due to the red lead internal protection. Extensive 'dust' deposits had not been found even with old type of syphon in old pipelines, so there would probably be little or no change of velocity in the Torpedo syphon. He had not thought it necessary to provide flexibility by means of lead loops or other ways. Flexibility of the service tube and the elimination of anchorage in the house structure he considered adequate, and his general experience substantiated this contention. Where stresses became severe any resultant movement was detected by observable distortion or by a minor leakage. If provision for flexibility was made, the first sign of applied stresses causing damage to the service might be a complete collapse and possibly a full bore escape. In Germany the practice was to weld services and not to provide any flexible joints.

Mr. D. Dawson, Stourbridge, asked if twin sets of filters were fitted at governor inlets were dust troubles had been experienced. Referring to Mr. Jones' remarks that distribution was still regarded as the 'Cinderella' of the gas industry, he asked whether it were not possible to establish a national body to investigate and report on problems relating to the distribution of gas. It could perhaps be done at board level to ensure uniformity of practice at least throughout an area.

Mr. Jones replied that it was only necessary to fit single filters which would accommodate the full volume of gas passing through the governors. As to uniformity of practice at board level, divisional distributing engineers did in fact meet to discuss problems and achieve uniformity, but different methods existed because in the experience and opinion of individuals, the method they adopted was, without doubt, the best; only impartial technical tests could determine which of the varied methods was preferred.

The President, **Mr. R. W. Nelson,** interposed to say that distributing practice within an area was not as diverse as Mr. Jones seemed to imply. There were in existence training schools, and this should gradually lead to an agreed procedure, but nevertheless, there was a long way to go to achieve it.

Mr. G. Eccles, Stourbridge, asked whether Mr. Jones could obtain information from the National Coal Board as to its future pattern of mining so that appropriate action could be taken.

Mr. Jones said that the National Coal Board did indeed give advance information of their workings, but could not predict the surface effects of such workings.

Mr. D. T. Hall, Dudley, asked whether cathodic protection was applied to steel pipes in the North Staffs. Division.

Mr. Jones replied that in his opinion a high quality physical external protection of the pipeline was initially essential, cathodic protection was a reinforcement of this protection. Cathodic protection was used, and would be applied more extensively on major pipelines, but protecting a system of m.s. mains was a very different proposition to protecting long lengths of pipeline.

Mr. C. R. Kendall, Leicester, asked whether any cold bending was undertaken in Mr. Jones' division, and if so, what were the limits. He also wanted to know whether Mr. Jones had had any experience of the failure of welds on seam welded pipes of large diameter.

Mr. Jones said that he had had no experience of cold bending, since it was a practice associated with pipelining by the 'spread' method, the technique of which he had no personal experience. Bends used in his division were of fabricated construction. He had had no experience of seam weld failure on large diameter pipes.

Mr. A. V. Wainwright, Senior Vice-President, Shrewsbury, was interested in the protection of m.s. mains against corrosion, and said that at Shrewsbury a 1½-mile long m.s. main had been laid some 25 to 30 years ago in sand, along a road. The main was now being replaced, and it was found that it was only badly pitted where a portion of it ran through clay. The type of road surfacing used may, however, have been a factor which had contributed to the corrosion.

British Standard: Vitreous enamel finishes

THE revised edition of the British Standard for vitreous enamel finishes, (Kitchen equipment: Resistance to thermal shock and culinary acids—B.S.1344: Parts A1 and A2: 1960), is being issued in separate parts to draw attention to the fact that not all the requirements of this standard are appropriate to every purpose for which such finishes are used.

In the past, time and money were wasted because vitreous enamel finishes were often specified to comply with the whole of B.S.1344 and therefore, had to be subjected to all the tests laid down instead of just the appropriate ones.

Parts A1 and A2 of the revised standard have now been issued; both deal with vitreous enamel finished kitchen equipment. Part A1 (which supersedes Part 1, Section 3, of the old edition) specifies a standard and test for resistance to thermal shock.

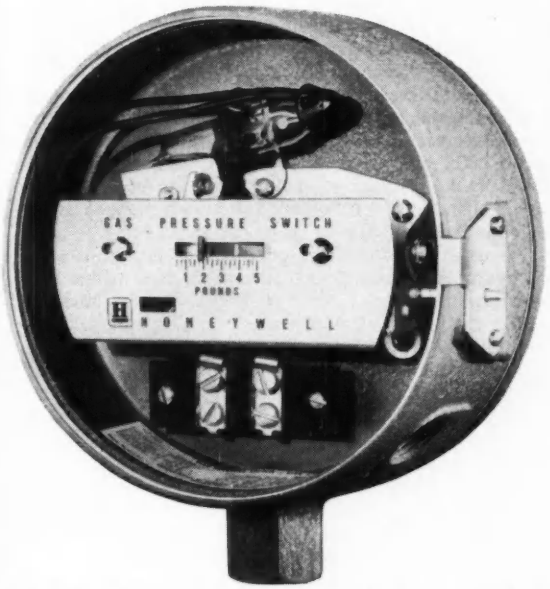
Part A2 (which supersedes Part 1, Section 1, of the old edition) lays down a standard for resistance to culinary acids and will be particularly useful for surfaces coming into contact with fruit juices. Four classes of resistance are specified in A2, the foreword making it clear that the highest class is not always necessary or indeed appropriate.

Further parts of this revised standard are being prepared, covering other properties.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1., price 3s. (Postage will be charged extra to non-subscribers).

Technical developments

Heavy duty gas pressure switches



NEW gas pressure switches have been introduced as part of their range of simple non-indicating industrial controllers by Honeywell Controls Ltd.

Designed for heavy duty under arduous operating conditions, these diaphragm-actuated mercury switch controllers can be used as safety cut-off switches or simple pressure controllers for both hazardous and non-hazardous gases.

They feature a seal-off diaphragm which prevents gas from entering the switch chamber should the main diaphragm be ruptured. This, together with the high overload capacity, confers a high degree of safety operation. With non-hazardous gases, the switches can be used as differential pressure controllers since the seal-off chamber becomes the low pressure side.

Pressure ranges from ½ in. to 5 in. w.g. to 10-100 p.s.i. are available. Switching action is SPST, make or break on pressure rise according to model. SPDT versions are available.

A lockout feature, optional on some models, standard on others, prevents re-cycling when the pressure returns to preset limits, having once broken circuit. This feature can be adjusted to eliminate the lockout if desired.—*Honeywell Controls Ltd.*

Constant voltage source

THE type 3 reference unit is a completely new solid-state d.c. reference source designed by George Kent Ltd., for use with the Company's range of electronic self-balancing recorders, indicators and controllers. A compact plug-in assembly operating directly from the normal a.c. mains supply, it provides an extremely stable, ripple-free output of 5mA at 5 V for the slidewire of the instrument measuring circuit.

Two Zener-diode stages in cascade reduce the effects of normal supply variations by a factor of at least 200, while individual temperature compensation of each of these stages ensures that the output is substantially independent of changes in ambient temperature between 10° and 70°C. An inherent advantage is that the unit continues to operate with only slightly reduced accuracy if the supply voltage is drastically reduced, even to as little as 30% of its nominal value.

The d.c. output is isolated from earth, and a specially screened and balanced mains transformer effectively isolates it from the mains supply. This feature is of great value in certain measuring circuits with a fine impedance to earth.

The exclusive use of solid-state components together with a very simple circuit configuration results in a rugged unit possessing a high degree of reliability. It is noteworthy that the only electrolytic capacitor employed is of the super-quality type, specially developed for applications where extremely long life is essential.—*George Kent Ltd.*

Chipping and scaling hammer

A NEW chipping and scaling hammer, known as the CP-455-L has been designed to meet the need for a lightweight powerful weld flux chipping tool; it is also widely suitable for chipping stone, metal, concrete and for carving wood. Clearance of chippings from the workpiece is catered for in this new tool by a jet of high velocity air which may be directed downwards, thus enabling the chisel point to be kept clear.

This new chipper uses a piston of $\frac{5}{8}$-in. bore and 1-in. stroke which gives 4,200 blows per minute at a pressure of 90 p.s.i. A particular feature is the use which has been made of a new type pulley valve which gives the same smooth throttling action as the somewhat heavier spool valve employed on larger hammers, thus enabling accurate control to be made of the speed and power of the hammer, this being by a lever type throttle. The pulley valve employed has a larger diameter and shorter length than the

spool valve, the resultant increase in working area of the valve enabling it to operate without loss of power when the valve clearance increases due to wear.

The standard chisel supplied with the tool is an angle scaling chisel, although a narrow blade chisel is available if required. The chisels are held in the hammer by a positive retaining device and cannot rotate, changeover being effected by a simple quick release retaining clip. The net weight of the tool is 4½ lb. and the overall length is 10½ in. The size of the air inlet thread is ¼ in.—*Consolidated Pneumatic Tool Co. Ltd.*

Industrial pressuretrol

A RECENT addition to the Honeywell range of pressure controllers is the new industrial Pressuretrol, model P428, designed for general applications requiring control or limiting of gas or liquid pressures up to 3,000 p.s.i. It can operate alone as a controller or with other instruments for limit, alarm or signalling service. Five ranges are available, from 30-300 p.s.i. to 300-3,000 p.s.i.

The industrial Pressuretrol consists of a mercury switch operated by a corrosion resistant Bourdon tube, enclosed in a heavy steel case which resists dust, weather and corrosion. Pressure setting knobs are conveniently located on the front; tamper-proof knobs can be provided.

Switch action is SPST, make or break on pressure rise, depending on the model. The position of the mercury switch is visible through a window in the front of the case. An explosion-proof model is available for use in hazardous atmospheres.—*Honeywell Controls Ltd.*

Aluminium joiner

AUTOCHEMIC 990 is a specially formulated paste compound which gives high strength, corrosion resistant joints on virtually all types of aluminium and aluminium alloys and requires no finishing or after treatment. No filler alloy is required.

The compound is merely painted on where required, facilitating preplacement on multiple or production joining applications, and giving great economy in use. A neat fillet easily cleaned in warm water is produced by applying the compound and heating indirectly. A series of chain-type reactions take place terminating in metallic reduction at the reaction temperature of 400°C.—*Eutectic Welding Alloys Co. Ltd.*

Portable compressors

CHAMBERLAIN PLANT LTD. is now receiving deliveries of both the water-cooled and air-cooled models of the larger 'Jenbach' JW440KF portable compressors, for which the Company is the sole distributor throughout the United Kingdom.

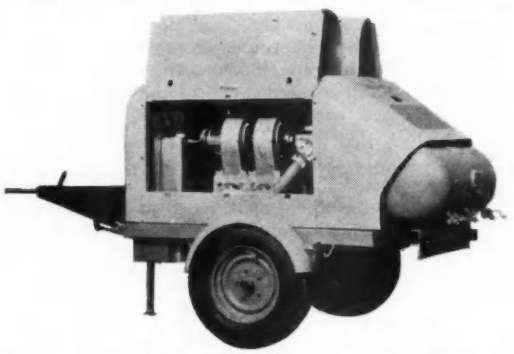
These compressors have the engine and compressor combined to form one integral unit whereby the power of the four-stroke engine is transmitted direct to the compressor by means of the main and ancillary connecting rods.

The suction/delivery valves in the cylinder head of the compressor operate automatically. Concentric location of the delivery valve around the suction valve provides a dual cooling effect: Internally due to the fresh air and externally due to the water jacket in the water-cooled model, and inside and outside cooling by air in the air-cooled model.

The compressed air leaving the high pressure cylinder under a pressure of 100 p.s.i. passes through an annular radiator before reaching the receiver at moderate temperature. A centrifugal blower fixed to the flywheel provides for fanning this recooler. The air aspirated by the engine/compressor unit is purified in oil bath filters. The volume drawn in is checked by a regulating valve which is controlled by the pressure prevailing in the air receiver. When the air chamber is fully charged suction is stopped and the engine is caused to idle by its governor.

The air chamber having a capacity of 5.2 cu.ft. is welded and hydraulically tested for leaks. It is fitted with a safety valve set for 112 p.s.i. working pressure, three cocks and a drain cock for condensed water. The compressor unit is started by means of electrical equipment comprising starter, preliminary heater, dynamo, regulator and a heavy duty battery. The fuel system contains a fuel tank of 9 gal. capacity, fuel pipes, microfilter, injection pump, two one-hole injection nozzles (mixture formed in antechamber) and leak oil return pipes. The exhaust pipe includes a silencer.

The unit is incorporated with all accessories—including tools—in a sprung single-axle frame with pneumatic tyres. The chassis frame consists of a rigid welded structure. The steel sheet covering with large side flaps offers reliable protection against the weather. The flaps may be locked



to prevent unauthorised interference. The drawbar with standard hitching eye is detachable and an adjustable low bar is provided.

Overrun brake, hand brake, brake stop light and lighting equipment for the number plate complete the equipment and permit the JW440KF compressor to be towed day or night on the road.—*Chamberlain Plant Ltd.*

Constant weight feeder

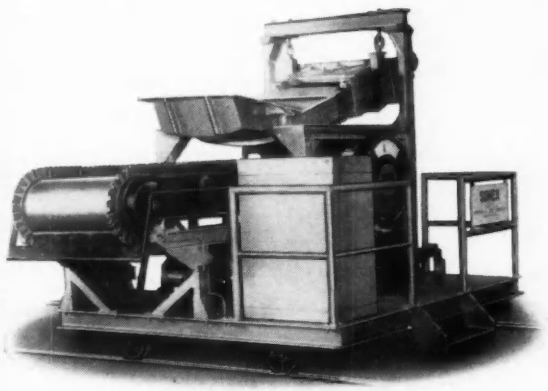
A NEW constant weight feeder for coke manufacture from Sinex comprises a special Sinex electro-magnetic vibratory feeder which draws pulverised fuel from an overhead hopper and feeds it to a constant speed belt. The entire belt assembly is mounted on the trunnions so arranged that only 10% of its weight is taken by the weighing machine, so that the weighing machine measures 10% of any variation in the weight of the belt plus coal continuously.

The weighing machine is fitted with contactless detectors

which consist in effect of an air-cored transformer. This passes no current unless an attachment to the needle in the form of a steel blade passes between the coils; when the needle deflects and passes the blade between the coils in either the high or the low direction, the current is applied to the grid of a thyratron valve, the anode current of which energises the feeder. Thus the weighing machine regulates the rate of feed so that the weight of the coal on the belt is held constant.

The throughput is 100 metric tons per hour and the weight is held constant at ±1%.

The problem of testing throughput accuracies was solved by taking a cine-film of the pointer fluctuations on the scale. The control circuits are rather more complex than



the above brief description indicates since a number of compensatory circuits are required. However the control desk is mounted on the equipment platform and is sufficiently robust to withstand gasworks conditions.

The fuel is stored in about 15 overhead concrete hoppers and the Sinex constant weight feeders are mounted on rails so that each can serve a number of hoppers. The feeders are moved under the selected hoppers, the conveyor belt is set in motion and the feeders are set on the control desk to the current proportion. For a change in formula the outputs of the feeders are adjusted or the feeders are moved to different hoppers.—*Sinex Engineering Co. Ltd.*

New 4-wheel drive frontloader

FOLLOWING the introduction of their 4-wheel drive frontloader 65A Merton Engineering have now brought out a further new model in their range of 4-wheel drive shovels, the Merton frontloader 80A.

This new machine is powered by the Ford 590E 6-cylinder diesel engine which develops 80 b.h.p. at 1,850 r.p.m. A single stage 3:1 stall ratio hydraulic torque converter and full power-shift epicyclic gear train transmit the drive to the driving axles which have a four pinion differential, crown and pinion spiral bevel primary reduction and final planetary reduction at the hubs. Two forward and one reverse speed give 0—4.8, 0—10.5 and 0—5.3 m.p.h. respectively.

Hydraulic brakes are fitted to all four equal-sized wheels and are of the internal expanding shoe type with Hydrovac servo assistance. All wheels are fitted with 12.00 by 24 8 ply Earthmover tyres with 13.00 by 24 tyres as optional. Steering is power-assisted to the rear wheels through a heavy duty Marles cam and double roller type steering box.

All hydraulic rams are double-acting and are controlled through a valve which has detent positions to give semi-automatic 'raise' and 'float' for faster working. The mobile load-lifting capacity is 4,000 lb. and the maximum crowd or 'pry-out' force is 10,000 lb.

The standard bucket is 7 ft. 1½ in. wide to cover the full width of the machine and has a s.a.e. rated capacity

of 1½ cu.yd. (or s.a.e. truck capacity of 1⅛ cu.yd.). It is strongly reinforced with doubling plates and manganese steel wearing strips. Smaller or larger capacity buckets are also available for very heavy or lighter materials.—*Merton Engineering Co. Ltd.*

Trade Publications

Wailes Dove Bitumastic Ltd. are issuing a new colour film with commentary, showing the methods used to coat and wrap steel pipes of various diameters on site and in their works at Hebburn. This film is of particular interest to gas, water and oil engineers, and arrangements are being made to show it in London in the near future. Copies may be obtained, on loan, by firms and associations connected with the pipeline industry. Applications to be made to:—The Publicity Manager, Wailes Dove Bitumastic Ltd., Hebburn.—*Wailes Dove Bitumastic Ltd.*

★ ★ ★

Chemical Engineering Wiltons Ltd., of the Simon Engineering Group, has issued a new booklet entitled 'Process Plant for the Chemical Industry'. Included in this publication are photographs of actual plants of different types supplied by this Company. Plant for tar derivatives, benzole extraction and rectification, by-product ammonia, effluent treatment, and solvent recovery are all set out together with the types of processes that may be undertaken with Wilton plant.—*Chemical Engineering Wiltons Ltd.*

★ ★ ★

Negretti and Zambra have recently issued three new publications. R30/2E deals with 'Electric Switch and Contact Automatic Controllers and Alarm Mechanisms'. A/19 details the 'Integrating Indicator (Type I.R.) for use with N & Z Aircraft Fuel Flowmeter'. Publication F25/S is the Spanish version of Negretti and Zambra's general catalogue, and is the 16th version of the Company's overseas catalogue.—*Negretti and Zambra Ltd.*

★ ★ ★

'Amal' is the name of a recently published catalogue by the firm of that name. In it are described the factory facilities and the functions and layout of the various sections of the factory. The second section of the catalogue describes the range of Amal products.—*Amal Ltd.*

North American Newsletter

PLASTIC-COATED PIPE CARRIES NATURAL GAS

A SPECIAL plastic-coated steel pipeline has recently been laid for the Petroleum Exploration of Lexington, Kentucky and Sisterville, West Virginia, in the United States, to convey natural gas over a distance of more than 22 miles. It will serve the towns of Corbin and London in Kentucky. It is expected to reduce the cost and need for pipe replacement and maintenance.

The pipeline traverses highly corrosive coalfield soil and swampland which generally make short work of normal steel piping and to which the plastic-coated line is expected to be immune.

The plastic coating is intended permanently to protect the steel from the acid formed by rain and other moisture draining through the piles of coal slag which constitute the greatest corrosive threat along the route.

Despite the rugged nature of the country through which the pipe was laid, the tubing was placed at a rate of 6,600 ft. a day. It was installed by the Cumberland Constructing Company, of Monticello, Kentucky.

Where rock soil was encountered during installation, the pipe stood up well to knocks and scrapes, being eased into position by side boom tractors which followed close on the cleats of a t[illegible]ching machine.

The pipe was delivered to the sit[illegible] from the steel mill with the ends o[illegible] each length cut back sufficiently to [illegible]llow welding; a pressure-sensitive [illegible]stic tape supplied by the steel compan[illegible] was used to wrap the exposed areas [illegible] the welded joints.

An electrified coil was placed [illegible]long the length of the pipeline to searc[illegible] out any possible breaks or 'holidays' [illegible] the coating.

Supplied by the Republic Steel Corporation, the X-Tru-Coat piping was 6⅝-in. in diameter, and it will operate at 350 p.s.i.

The high-density polyethylene coating was extruded over the steel pipe coated with a special adhesive. Its bright yellow colour was intended to reflect heat during handling.

A section of the 22-mile, plastic-coated steel pipeline which has been laid to carry natural gas through coalfield soil and swampland in Kentucky, U.S.A.

Industrial thermo-electric generator—

WHAT is claimed to be the first thermo-electric power generator designed for industrial application in the United States has recently been taken into service by the Northern Illinois Gas Company, Aurora, Ill., to supply D.C. current for cathodic protection against self-corrosion of the company's gas pipelines.

Designed and built by the Westinghouse Electric Company, in its Semiconductor Department at Youngwood, U.S.A., the new generator is a 100-watt unit and will also be used for charging batteries of a microwave relay system.

It is about 24 in. high and weighs about 75 lb.

Propane gas is burnt in an assembly at the base of the unit and the hot gases pass through a central insulated chimney, around which the thermo-electric couples are mounted to generate electric power as the heat is transferred through them.

Such generators are completely static and are readily adaptable for applications in remote unattended locations.

Improvements in thermo-electric materials have recently made the commercial availability of the devices possible. In the case of the Northern Illinois Gas Co., most of the pumping stations have access to electric power lines, but a few of them are located in outlying remote areas where electric power is not available.

It is for such stations that thermo-electric generators are ideally suited and can provide all the power requirements including meters, valve control and microwave relaying equipment.

The new unit will also be used as part of a research programme by Northern Illinois Gas Co., to investigate additional industrial applications of thermo-electric power generators.

In addition to the 100-watt size, other sizes ranging from 5 to 500-watts are also available. Petrol or natural gas can also be used as fuel and forced air, water or natural convection used for cooling purposes.

—It helps to protect gas lines

CANADA JOINS U.S. IN CLOSE PR SCRUTINY

PUBLIC relations and how it can best serve the gas industry has been under close scrutiny at a public relations workshop sponsored jointly by the Canadian Gas Association, the American Gas Association and the Pacific Gas Association at Portland, Oregon.

The associations act as co-ordinating and advisory bodies in the promotion and development of all phases of the gas industry.

Pacific Gas Association is made up of members of the U.S. industry west of the Rockies; the Canadian and American groups serve members in their respective countries on a national level.

INTO FOCUS

More than 75 representatives of the gas industry in the two countries attended the workshop which was designed to bring into sharper focus the importance of an effective public relations programme.

In a series of panel discussions and addresses by top executives, new methods of acquainting the public with the product and winning its acceptance were examined; the effectiveness of current public relations policies was assessed and the pitfalls of an unplanned, haphazard public relations programme were brought to light.

Mr. R. K. Farris, President of Northern Ontario Natural Gas Co. Ltd., Toronto, and Mr. H. L. Purdy, President of B.C. Electric Co. Ltd., Vancouver, took part in a panel discussion. 'The President Looks at Public Relations,' dealing with what management expects of public relations people and *vice versa*.

How the public relations department helps or hinders a company's ability to improve its earnings was dealt with in another panel discussion, 'Financial Management Looks at Public Relations.'

The Canadian report was given by Mr. F. Warren Hurst, Vice-President and Treasurer of the Consumers' Gas Company, Toronto.

NEW THERMAL INSULATION VENTURE IN MEXICO

CAPE ASBESTOS thermal insulation materials will shortly be manufactured in Mexico. The Cape Asbestos Co. Ltd., have taken a financial interest in Aislantes Industriales, S.A. de C.V., of Mexico City, manufacturers of foamed polystyrene insulation products and asbestos 'Aircell' pipe covering for low temperature work.

Aislantes Industriales will begin manufacture of 'Caposite', amosite pipe sections for high temperature insulation.

FOUNDED IN 1959

Aislantes Industriales, S.A. de C.V. was originally founded early in 1959 under the corporate name of Frigolit Mexicana, S.A. by Mr. H. Rowe Morris, who is head of the Materiales Aislantes group of companies the leading manufacturers and contractors for thermal insulation in the Republic of Mexico.

Materiales Aislantes, S.A., of Monterey, founded in 1939 by Mr. Morris, was the first company in Mexico to manufacture mineral wool products, and for the past 21 years this company has specialised in high temperature industrial insulations for heat control in steel mills, power plants, paper mills, sugar refineries.

Over many years it has been entrusted with a very large portion of business for PEMEX, the national Mexican oil company.

About five years ago, Materiales Aislantes, S.A., of Mexico City, was established as a fully co-ordinated insulation sales company. In 1959, to broaden the range of thermal insulations produced in Mexico and to include low temperature insulations, Mr. Morris, along with Mr. Hans Lenz, Ing. Alejandro Robles Gil, and other leading industrialists in Mexico, formed Frigolit Mexicana, S.A. to manufacture foamed polystyrene products.

In August of 1960, with the advent of Cape Asbestos financial participation and the plan to broaden further the activities to include high temperature moulded amosite insulation, the corporate name of Frigolit Mexicana, S.A. was changed to Aislantes Industriales, S.A. de C.V.

NEW FACTORY

A new factory is under construction by Aislantes Industriales, S.A. de C.V. in Santa Clara, some 15 miles north of Mexico City. Specialised equipment will be supplied by Caposite Insulations Ltd., a Cape Asbestos associated company in Canada.

IT'S ALL TOGETHER NOW FOR C.G.A.

THE Approvals Division of the Canadian Gas Association has moved from its former quarters at 2532 Yonge Street, Toronto, to the Association's new headquarters at 55 Scarsdale Road (Don Mills), North York, in the first step of a transfer which will put the Association's entire operation under one roof.

Mr. H. Dalton, Managing Director of C.G.A., said the move, when completed, will improve over-all efficiency and enable the Association greatly to accelerate its appliance and equipment testing programme.

5 MILES AWAY

The administration and approvals divisions of C.G.A. have occupied the Yonge Street building for more than two years, but the testing of appliances and equipment to meet C.G.A. standards has been done at the Ontario Research Foundation, Queens' Park, five miles away.

All laboratory equipment, which includes devices for testing everything from a 25-lb. furnace conversion burner to a 15-ton industrial heating boiler, is to be moved to the new building and installed by the end of February.

Administrative personnel will move to the new headquarters building early in May, on completion of a two-storey office addition now under construction.

OIL AND GAS INCOME IS HALVED

NET income of the Hudsons Bay Oil and Gas Company and its subsidiaries (before special credits) dropped to $1,004,000, or six cents a share in 1960, from $2,821,000, or 16 cents a share in 1959.

The company's net output of crude oil and natural gas liquids reached a new record in 1960, averaging 22,689 barrels daily, an increase of 1,435 barrels daily or 6.8% over 1959, says *The Times*.

Sales of natural gas averaged 44,300,000 cu.ft. daily, slightly less than in 1959.

However, sales of natural gas are expected to increase substantially during the next year as development of reserves dedicated to export markets is completed.

NEWS SUPPLEMENT

Germans develop a natural gas freighter

A GROUP of prominent German industrial firms is developing a special tanker for the transport of liquefied natural gas.

The ship will have a loading capacity of 12,000 tons, but the liquefied natural gas refrigerated to −160°C. can be loaded to the equivalent capacity of an oil tanker of 27,000 tons.

The plan provides for five loading spaces in the ship, three with four compartments of 1,300 cu.m. each and two of four compartments of 750 cu.m. each.

The installation of the boxes in the loading room was a great technical problem. The builders had to develop their own patent method by which the compartment rests upon an insulated floor capable of carrying the load.

The natural gas which evaporates during the trip—5% daily—could be used for the firing of the boilers, but, since the quantity is greater than necessary for this purpose, it is planned to reliquefy this gas in refrigeration plant installed on the ship.

OIL GAS PLANT FOR DUBLIN

A CYCLIC catalytic oil gas plant has been ordered by the Alliance & Dublin Consumers Gas Company.

P.G. Engineering Ltd. (an associate of The Power-Gas Corporation Ltd., of the Davy-Ashmore Group) has just announced that it has been instructed to proceed with the building of the plant.

It will consist of two units of the Segas process, producing town gas from heavy oil. The contract is to be completed by August 1962.

Other Segas plants at present under construction comprise two units for Gothenburg, Sweden, and two units being built under licence arrangements for Madrid, Spain.

MINISTER AND BOARD PROBE COAL REVENUE

ALTHOUGH the National Coal Board accounts for 1960 will show a 'substantial loss,' the Board will not be able to lift its prices further 'because it has almost reached the point of no return,' the Commons has been told.

Mr. J. C. George, Parliamentary Secretary to the Ministry of Power, said this when replying to a debate on the Board's vote.

Earlier, the Minister, the Hon. Richard Wood, had said that he was making an examination of the Board's revenue position jointly with N.C.B. officials.

He also gave some encouraging pointers to the future of the industry, says the parliamentary correspondent of the *Financial Times*.

Considerable further reductions of stocks are likely this year—probably between 7m. and 10m. tons. Demand for coal has risen above output.

MANPOWER

The loss of manpower appears to have been halted. The level of capital investment required is lower than was envisaged a year ago, and so too is the amount of the Board's borrowing.

But at June 30 last year the accumulated deficit had reached £63.5m. The coal price increases of last autumn had had no time to affect the position since then.

Mr. Wood rejected 'prescriptions' for the health of the industry advanced by Mr. Ray Gunter, the newly promoted Opposition spokesman on fuel and power.

Mr. Wood envisaged coming before the House again with proposals for the industry when his examination was completed.

The Government defeated the Opposition in a division at the end of the debate by 76 votes (299-223).

Sulphur extraction plant order

AN order for a plant to deal with approximately 11 mill. cu.ft. of refinery gas a day has been received by R. & J. Dempster, Ltd., of Manchester, one of the licensees appointed recently by the patentees, the North Western Gas Board and the Clayton Aniline Company, to market the Stretford sulphur extraction process.

The plant will be delivered and erected at Antwerp, and is the first operating on this process to be ordered.

B.H.D. buys out Constructional Engineering

B.H.D. Engineers has bought for an undisclosed sum the Constructional Engineering Company, of Birmingham, and its subsidiaries, E. Tallis and Sons and Adaptable Moulding Machine Company, from the executors of the late Mr. D. Howard Wood states the *Financial Times*.

HONG KONG FLATS

Two of three blocks of flats recently completed in Hong Kong. The first of these to be constructed employed no gas water heating, but the last two, because of complaints from the first block's tenants, had gas heaters installed. Ascot Gas Water Heaters Ltd., employed 80 of their 715 balanced-flue multipoint heaters and 70 of their 503/1 sink heaters for these two blocks.

Parkinson Cowan move to increase borrowing powers

Operations at Parkinson Cowan for the first 12 months of its current 15 months' financial period ending March 31, 1961, were 'barely profitable,' states the *Financial Times*.

This is stated in a letter to holders from the Chairman, Mr. H. P. Barker, giving the Directors' reasons for proposing an increase in borrowing powers.

In recent years, he explains, the Group's activities and turnover have greatly increased. In the last three years two businesses have been purchased for cash from current resources, the factory in Manchester has been substantially extended, and a new factory built in Canada.

The issued share capital has not been substantially increased since 1930. Mr. Barker says it had been clear to the Directors for some time that it would soon be desirable for the Company to increase its capital and it had been hoped to do so in 1960, but the unfavourable developments of the year, following the Government's restrictive measures in May, made this inopportune. The Directors intend to take this step at some favourable occasion.

Meantime the need to enlarge borrowing powers has arisen for two reasons. The recession in national markets for nearly all domestic appliances has continued, and the adaptation of this branch of activities to a lower level has resulted in a temporary increase of stocks.

Furthermore, these conditions, coupled with a slower rate of improvement than was expected in some other divisions of the group, have affected results more adversely than the Chairman anticipated last October, and the Group has not been able to accumulate funds from this source as normally.

To maintain an active policy of product development in these circumstances will require temporary finance in excess of the existing limitations, Mr. Barker says.

Meetings to approve the borrowing powers increase will be held on March 13.

At the touch of a button

BEFORE the end of this year Sowerby Bridge works, near Halifax, will be a single-storey building, about 30-ft. long, housing fully automatic governors controlling gas pressure from the North Eastern Gas Board's West Yorkshire grid system.

Work on the new station has been in progress since last summer, and it is hoped that the system will be in operation in the town by November.

The supply will then be controlled by a technician at the touch of a button at Tingley, 15 miles away, and it will be supplied through one of the most modern smoke-free plants in the North.

It is expected that, under smoke control regulations, more and more premises in this part of the country will turn to gas-fired heating.

India to explore new oilfields for natural gas

THE Oil and Natural Gas Commission, India, has decided to go ahead with the trial production of crude and associated gas from the Cambay and Ankleshwar oilfields as from next October. The decision was taken at a two-day meeting under the chairmanship of the Minister for Oil and Natural Gas, following enquiries about the availability of natural gas in these fields.

A daily production of 5 mill. cu.ft. of oil as well as gas is expected from October next for use in heating boilers and generating power. The Commission hopes to sell part of the gas for local and industrial fuel in small quantities.

By 1963, regular production of oil from Cambay and Ankleshwar will enable a daily output of up to 15 or 20 mill. cu.ft. of associated gas. This gas, and that from the refinery proposed to be erected in Gujerat by the same time, is expected to be available for domestic and industrial use.

Pig production

MERCOL Descaling Co. Ltd., is now manufacturing pipeline pigs. At the present time this is limited to contractual work.

As soon as factory space permits all types of gauging, cleaning and purging pigs will be manufactured for direct sale.

The usual launching and receiving equipment is available and further details can be obtained for any specific size.

Gas cooker output shows increase

The November, 1960, gas cooker production figure increased by 1,200 to a total of 52,500 compared with the October figure of 51,300, states the *Financial Times*. During November, 1959, production totalled 68,600.

DRIVING AWARDS

Safe driving awards have been presented in Perth to 21 employees of the Central and Northern Division of the Scottish Gas Board. The two top awards were a bar to a 20-year brooch for Mr. W. Lyons and a 20-year brooch for Mr. J. Page.

Calor gas sales rise sharply

THE joint managing director of the Calor Gas (Distributing) Co. Ltd., Mr. P. Pleydell-Bouverie, has told his company's annual conference at Eastbourne that dealer sales of its propane liquefied petroleum gas increased by about 80% last year.

He also disclosed that Calor's industrial division simultaneously achieved increases of about 50% and about 20% in sales of bulk gases and new installations respectively.

Except in a single instance, 1960 also produced increased sales from an increased range of Calor-fuelled heating, cooking, lighting, refrigerating and technical appliances.

Kent's acquire control of the Tieghi Company

GEORGE KENT LTD. has acquired 51% of the share capital of the Tieghi Company of Milan and Lenno. A new company has been formed, Kent-Tieghi S.p.A., and this has purchased the whole of the assets and goodwill of the Tieghi Company.

The Directors state that they expect the new company will continue to expand and fortify the trading and technical abilities already attained by the Tieghi Company, which has enjoyed a leading position among the industrial instrument and controls manufacturers of Italy. Continuity of management is assured.

For several years there has been close technical and commercial collaboration between Kent and Tieghi.

Kent-Tieghi's products at present include recorders and controllers for flow, pressure and temperature of liquids and gases (both circular and rectangular chart) using pneumatic control systems.

More recently, a range of miniature pneumatic recorders and controllers, and force-balance transmitters, has been put into quantity production. The company also holds an exclusive import and distribution franchise for the American Cono-flow range of pneumatically operated control valves.

Ashmore's foundry business sold to new company

A NEW Company is to take over the foundry business of Ashmore, Benson, Pease and Co. Ltd. as a going concern. The new Company is registered under the name Parkfield Foundries (Tees-side) Ltd., and arrangements are being made for the assignment of the existing Ashmore Foundry contracts to the Company.

Within the next two to five years the Company will obtain possession of all the factory buildings and the offices at the Parkfield East Works, to enable it to expand its activities in the production of high duty iron castings manufactured by the Meehanite and spheroidal graphite iron processes. Arrangements are being made for the licences currently held by Ashmore's for these processes, to be transferred to the new Company.

First directors

The first directors of Parkfield Foundries (Tees-side) Ltd. are: Mr. G. T. Cantlay, Chairman, the Hon. Anthony Berry, Mr. E. K. Gould and Mr. G. Hobman. Mr. G. B. Taylor, who has been sales manager of Ashmore's Works Division, and formerly foundry manager of the A.B.P. Foundry for a period of 15 years, has been appointed Managing Director of the new Company.

The Company will offer employment to most of the staff and workpeople at present engaged in the foundry, and will require to recruit additional moulders and pattern makers immediately to deal with the expanding volume of work.

Mr. John Armitage Drake, Chairman and Managing Director of Drakes of Halifax, with his wife, Mrs. Ada Drake, son, Peter Michael (12), *and son John Christopher* (10), *after receiving the* C.B.E. *at Buckingham Palace.*

The Fulham appliance test laboratory of the North Thames Gas Board is having this supervisory data centre to control temperature and atmosphere in the laboratory. Instrumentation includes dry bulb temperature and humidity controllers inside this cabinet. Outside are seen multi-point strip chart temperature recorders, circular chart air flow recorders and a multi-point precision indicator. Suppliers are Honeywell Controls Ltd. and contractors are Brightside Heating and Engineering Co. Ltd.

SMOKELESS FUEL: AN ASSURANCE

THE quality of smokeless fuel being provided in smoke control areas in Glasgow was the subject of a recent Commons question by Mr. James McInnes (Lab., Glasgow Central)

He asked the Minister of Power if he is aware of dissatisfaction in Glasgow and if he would have investigations made to effect an improvement.

Mr. John George, Parliamentary Secretary, Ministry of Power said: 'The solid smokeless fuel being supplied in Glasgow is almost entirely "Gloco". I am assured by the Scottish Gas Board that its quality is fully in accordance with the appropriate British Standard specification, but that they will be glad to investigate any case of dissatisfaction.'

Premises bought for showrooms

Premises at 33 and 34, Market Place, Loughborough, Leics., have been acquired by the East Midlands Gas Board for use as showrooms.

When they are brought into use the Board will close the present showrooms in The Rushes.

It has not been decided whether the Market Place premises will need to be reconstructed completely or merely altered and the Board's architects are to make a report.

Flowmeters: New company is formed

FORMATION of a new subsidiary company, Rotron Controls Ltd., owned jointly with The Rotron Controls Corporation of Woodstock, New York, is announced by Elliott Brothers (London) Ltd., a member of the Elliott-Automation Group. Elliott's have a two-thirds controlling interest in the new Company.

Rotron Controls Ltd., will have its headquarters at the Elliott-Automation factory at Airport Works, Rochester, Kent.

It will manufacture the range of flowmeters and associated equipment developed by the Rotron Controls Corporation for positive and mass-flow measurements in the oil, gas, water and petro-chemical industries. It will sell these instruments throughout Europe, the Middle East and the British Commonwealth (except Canada).

The new Flowmeter measures the rotational speed of a vortex created outside the main stream, which is directly proportional to the rate of flow of the fluid in the pipeline.

DIVIDEND

In spite of a fall of some 36% in group pre-tax profits to £145,828 Negretti & Zambra, the scientific instrument makers, are maintaining their total ordinary and "A" ordinary dividend at 15% with an unchanged final payment of 11%.

PERSONAL NOTES

DR. W. DAVIDSON is now in charge of Research and Development for Powell Duffryn's Heating Division, and he has joined Powell Duffryn Technical Services Ltd. Dr. Davidson has had a wide experience in the development and application of all types of heating equipment during his 24 years service with the Radiation Group of Companies. He has in particular assisted the gas boards in furthering the adoption of gas-fired warm air heating by local authorities, speculative and private builders. He will continue to co-operate with the gas boards in the extension of the already wide range of domestic, commercial and industrial gas-fired equipment manufactured by the subsidiary companies of Powell Duffryn Ltd.: Janitor Boilers Ltd., Hurseal Ltd., Gulf Radiators Ltd., and Powell Duffryn Modulair Ltd.

MR. V. W. LOWE, chief engineer of Erskine, Heap & Co., Ltd., has been appointed a Director of the Company. Mr. Lowe served his college apprenticeship with Ferguson Pailin Ltd. After some years as a research engineer with that Company, he became senior electrical engineer at Dalton Works, Dyestuffs Division I.C.I. In 1949 he was appointed chief engineer, Switchgear Division, Brush Electrical Engineering Company, and in 1955 took up his present position as chief engineer of Erskine, Heap & Co. Ltd.

REV. EDWARD HUTCHIN, who was formerly in the gas industry for a number of years, is leaving his parish of Barrow-on-Humber with New Holland in North Lincolnshire to move into South Lincolnshire to take the living of St. Matthew's, Sutton Bridge. At the time he resigned to train as a Church of England clergyman he was distribution engineer and superintendent with the Southern Gas Board for the Haslemere and Midhurst areas of Surrey and Sussex.

MR. R. H. E. THOMAS, O.B.E., who retired as member for marketing and purchasing of the National Coal Board last June, has accepted an appointment as Commercial Adviser to Renwick, Wilton and Dobson Ltd. Mr. Thomas was with the Company from 1912 to 1915 at the start of his career.

COUNCILLOR R. G. FISH, of Ashton-under-Lyne, and ALDERMAN W. T. MARRIOTT, of Accrington, have been appointed members of the North Western Gas Consultative Council.

MR. J. M. H. MATHESON, district manager, Scottish Gas Board, has been appointed Service Manager, North Western Gas Board, Blackpool.

MR. N. J. ROBERTSON, general manager of the Alliance and Dublin Consumers Gas Co., has been appointed a director of the company.

German News Letter

THE West German government plans to install a ring gas pipeline from Mannheim to Karlsruhe, Stuttgart, Ulm, Augsburg, Munich, Ingolstadt, Regensburg, Nürnberg, Bamberg, Würzburg and Mannheim. Stuttgart and Mannheim have already asked for permission to build a gas pipeline between their two cities.

The city of Braunschweig has made a contract with the Deutsche Erdöl A.G. in Hohne for the delivery of 10 mill. cu.m. of natural gas yearly. Beginning in February 1961, the raising of steam for power production at the Braunschweig electrical generating plant will not be as hitherto exclusively confined to brown coal, but 15% will be raised in boilers fired by natural gas.

Experts of the Hamburg gas plant are studying the possibilities of the production of a non-toxic town gas. Until a solution has been found, all endeavours will be supported for the introduction of completely accident proof gas ovens.

After the completion of the underground gas storage at Engelsbostel near Hanover, a second storage of a similar kind has been planned near Darmstadt which will have a depth of 500 metres, and will be able to deliver 1 mill. cu.m. of gas daily.

Name change?

STOCKHOLDERS of the Staveley Coal and Iron Company are being asked to agree that the company's name be changed to Staveley Industries, says *The Times*.

The chairman, Mr. John Hunt, says the change would be more in keeping with the company's present activities, which now consisted 'almost entirely of shares in subsidiary companies operating in a variety of industries.'

COMING EVENTS

March 8.—EASTERN JUNIORS: Stevenage. Visit to D.S.I.R. Laboratory, Warren Spring, in Morning. During Afternoon Paper by B. J. Fuller at Hitchin.

March 8.—WALES AND MONMOUTHSHIRE JUNIORS, NORTH WALES SECTION: Holywell. 'Industrial Relations,' by Mr. Carson.

March 11. — MANCHESTER DISTRICT JUNIORS: Lancashire Cricket Club Pavilion, Old Trafford, Manchester. Annual Dinner. 5.30 p.m.

The London address of Whessoe Ltd. was changed on February 27 last to:—40, Broadway, London, S.W.1. Telephone: WHItehall 6034.

OBITUARY

SIR ARTHUR SMOUT, in 1953 appointed chairman of Murex Ltd., and Murex Welding Processes Ltd., has died at the age of 72. In 1934 he became managing director and from 1934 to 1942 chairman of what is now known as Imperial Chemical Industries, Ltd., Metals Division. He was appointed to the main board of I.C.I. in 1944. Sir Arthur was a fellow and a former president of the Institute of Metals, a fellow of both the Royal Institute of Chemistry and the Institution of Metallurgists, and was a vice-president of the Institution of Mining and Metallurgy.

The death has occurred at the age of 53 of MR. THOMAS RICKMAN LYNAM, director and general manager of Oughtibridge Silica Firebrick Co. Ltd., Oughtibridge, near Sheffield. Mr. Lynam, who had previously been on the staff of Sheffield University, was a Fellow of the Royal Institute of Chemists, a Fellow of the Institute of Ceramics, and a Fellow of the Geological Society. He was mainly responsible for the development of chrome magnesite bricks in this country.

MR. J. H. ASTON, a former chairman of Tube Investments, has died at the age of 90. He became the first managing director of Tube Investments on its incorporation as a public company in 1919, and took over as chairman in 1941, a position he held until 1944. He retained his seat on the Board until his retirement in 1947.

The death has occurred of MR. ERNEST BEAL, of 30, Furze Platt Road, Maidenhead, aged 85. Until his retirement, he was the manager of the old Maidenhead Gas Company. He took an active part in the life of the town, being a member of the Constitutional Club. A keen bowler, he was a member of the Maidenhead Desborough Bowling Club.

Wigston (Leics.) Rural District Council will cease to take responsibility for the maintenance and replacement of gas or electric cookers. The cookers involved are those installed in the 573 council houses and bungalows which they built between 1950 and 1956. The tenants will be taking over the responsibility and if they leave or buy new cookers, the old cookers must revert to the Council.

The West Midlands Gas Board's social and sports club held its annual dinner at Rudyard in Staffordshire. Long service awards were presented to Mr. J. V. Ashby and Mr. P. Miller, each of whom had 25 years' service.

J. BROWN & CO. LTD
SAVILE TOWN, DEWSBURY, YORKS.

Supply:—

"BROWNOX-de-LUXE" PURIFYING MATERIAL

Purchase:—

SPENT OXIDE

PATENTS AND TRADE MARKS

KINGS PATENT AGENCY, LTD.
(Director, B. T. King, A.I.M.E.), Patent and Trade Mark Agents, 146a Queen Victoria Street, London, E.C. Booklet on request. City 6161.

TENDERS OPEN

LISBURN URBAN DISTRICT COUNCIL

GAS DEPARTMENT

TENDERS are invited for the supply, delivery and erection of Two District Governors and Control equipment for a Gas Holder Station.

General Notes and Specification can be obtained on application to the undersigned.

R. C. NEWELL,
Town Clerk.

Town Hall,
Lisburn, Co. Antrim.
February 22, 1961.

APPOINTMENTS VACANT

EAST MIDLANDS GAS BOARD

NOTTS & DERBY DIVISION

AN ASSISTANT DISTRIBUTION ENGI-NEER is required by the EAST MIDLANDS GAS BOARD in the DERBY DISTRICT which comprises a high and low pressure distribution system.

The Assistant, who must be a qualified Gas Engineer, will be required to deputise in the absence of the District Distribution Engineer.

The salary range for this superannuable post is £975/£1,180.

Applications should be sent within 10 days to:

K. L. Pearce,
Divisional General Manager,
East Midlands Gas Board,
Notts & Derby Division,
P.O. Box No. 62,
Friar Gate,
Derby.

SOUTH EASTERN GAS BOARD

INSTRUCTOR IN MAINS AND SERVICE LAYING

Personnel Manager's Department

APPLICANTS should have extensive practical experience in all types of mains and service laying work, and be capable of instructing new recruits and of giving refresher courses to existing personnel.

The duties will be mainly concerned with instruction in mains and service laying by means of practical demonstrations and lectures to be given at a Training Centre situated in London.

Salary within Grade 8 or 9 (Met. Area) £865—£965 or £930—£1,050 according to qualifications and experience.

Applications in writing, quoting reference V10/1417 and giving full details, should reach the Personnel Manager, Katharine Street, Croydon, not later than Monday, March 6, 1961.

CHEMIST
required at
SCUNTHORPE WORKS

SALARY according to age, experience and qualifications in range rising to £930 per annum.

Scunthorpe receive approximately 10 m.c.f. per day of Coke Oven Gas for purification in Tower Purifiers. A Butane Air Plant is shortly to be constructed.

Detailed applications should reach:

The Secretary,
East Midlands Gas Board,
University Road,
Leicester,

by March 18, 1961.

WEST MIDLANDS GAS BOARD

WALSALL AND DISTRICT DIVISION

VACANCY FOR
SALES AND SERVICE SUPERINTENDENT, WEST BROMWICH DISTRICT

CANDIDATES should have considerable ex-perience in the installation and maintenance of all types of commercial and domestic gas appliances and the control of Sales and Service staff. Possession of an I.G.E. qualification in Gas Engineering (Supply) would be an advantage.

The person appointed will be responsible for controlling the Sales and Service Department of a District comprising approximately 26,000 consumers.

The salary will be within £975-£1,095 per annum, and a modern house is available at a reasonable rental.

Applications, stating age, qualifications and experience, should be addressed to Mr. F. Harvey, Divisional General Manager, West Midlands Gas Board, West Bromwich Road, Tame Bridge, Walsall, **to reach him not later than March 13, 1961.**

NORTHERN GAS BOARD

TEES-SIDE DIVISION

DEPUTY DIVISIONAL GENERAL MANAGER

APPLICATIONS are invited for the position of Deputy Divisional General Manager of the Tees-side Division. Applicants should have sound experience of administration and control on a functionalised basis, covering sales, consumer service, production, distribution and accountancy, and be corporate members of the Institution of Gas Engineers or possess other appropriate professional qualifications.

The salary offered will be within Group 'F' of the Senior Gas Officers' National Salary Scales, and the successful applicant must join the Board's pension scheme and may be required to pass a medical examination.

Applications (in duplicate) stating age, details of experience and qualifications, together with the names of two referees, must reach the undersigned not later than 10 a.m. on Monday, March 27, 1961.

JOHN F. JACKSON,
Secretary.

30, Grainger Street,
Newcastle upon Tyne, 1.

NORTH EASTERN GAS BOARD

MAINLAYING INSTRUCTOR

APPLICATIONS are invited for the position of Mainlaying Instructor at a Salary within Grade APT. 9 (£895/£1,015 per annum).

Applicants should have a comprehensive and practical knowledge of all aspects of mainlaying and service laying and will be required to instruct Distribution personnel by practical training courses, which will be held principally in Leeds.

The successful candidate will also be required to assist with Gas Fitting training from time to time and a knowledge of gas fitting will be an advantage. Preference will be given to candidates in possession of the Institution of Gas Engineers' Certificates in Gas Engineering (Supply).

Application Forms may be obtained from the Area Distribution Engineer, 2, Market Street, Shipley, and should be returned to him not later than March 15, 1961.

J. C. GARDNER,
Secretary.

CROYDON

THE COUNTY BOROUGH OF CROYDON EDUCATION COMMITTEE invite applications from suitably qualified persons for the following vacancies which will become tenable in September:—

CROYDON TECHNICAL COLLEGE,
Fairfield, Croydon

Principal: D. A. Green, M.B.E., B.Sc., M.Ed.

DEPARTMENT OF MECHANICAL ENGINEERING

(a) Assistant Grade 'B' to teach Gas Fitting, theory and practical to C. & G. Final standard.

(b) Assistant Grade 'A' to teach Gas Fitting theory and practical to C. & G. Intermediate standard.

(c) Assistant Grade 'B' to teach Heating and Ventilating Engineering Fitters work (C. & G. 179 Course) theory and practical.

(d) Assistant Grade 'A' to teach Welding theory and practice in the Heating and Ventilating Fitter/Welders Course (C. & G. 180).

Salary in accordance with the Burnham Technical Scale with London Area Allowance, i.e. for Assistant Grade 'B' £738 or £751 rising to £1,201, and for Assistant Grade 'A' £558 or £571 rising to £1,051. Starting point on scale dependent on previous experience.

Further particulars and forms of application may be obtained from the Chief Education Officer, Education Offices, Katharine Street, Croydon, and should be returned to the Principal within fourteen days of the appearance of this advertisement.

WOODALL-DUCKHAM CONSTRUCTION COM-PANY LTD. have vacancies for plant commissioning and operating engineers.

Young men with some basic chemical engineering knowledge, and experience in gasworks or coke oven practice, who would be interested in this type of work and are willing to travel both in this country and abroad, should apply with full particulars of education, present position, etc., to:

Personnel Officer,
Woodall-Duckham Construction Company, Ltd.,
Woodall-Duckham House,
63/77, Brompton Road,
London, S.W.3.

These positions carry good salaries with opportunities for promotion, pension fund, bonus, and life insurance schemes.

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ALBION ★ WEST BROMWICH ★ (STEEL) LTD
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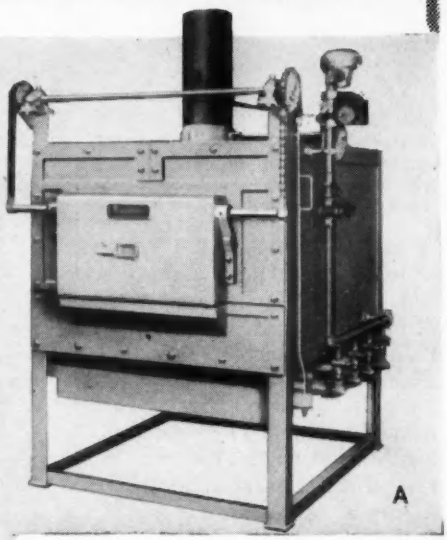
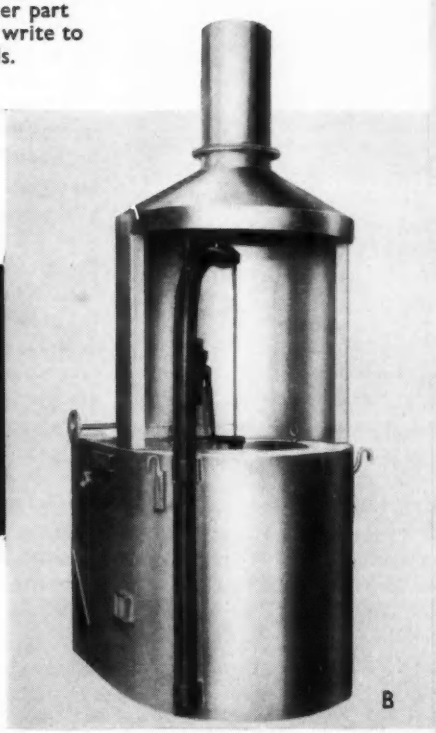
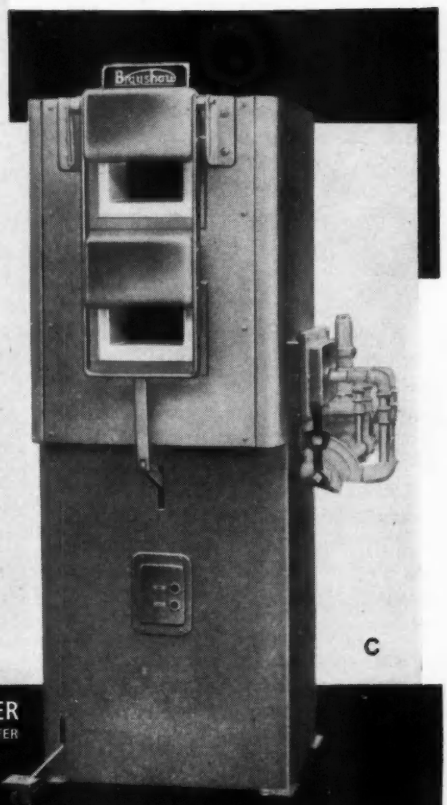
IRON AND STEEL, SHEETS AND PLATES, BARS & SECTIONS

NEW STANDARDS *in tool room heat treatment*

Brayshaw Engineers and Technicians are constantly engaged in an intensive research and product development programme designed to maintain our leadership in the manufacture of new furnace equipment of proven dependability and accuracy in widely diverse applications. The products illustrated are just a few examples from our extensive range.
If you would like information on these or any other part of our range please write to us for further details.







What the illustrations show:

A.—'Hynor' Oven Furnace.
B.—Liquid Bath Furnace.
C.—Twin Chambered High Speed Steel Furnace.

Brayshaw FURNACES LTD

BELLE VUE WORKS · MANCHESTER
TEL. EAST 1046 GRAMS: HARDENING, MANCHESTER
SHEFFIELD OFFICE:
84 BLONK ST., SHEFFIELD 3 TEL. No. 22449
LONDON OFFICE:
232 BISHOPSGATE E.C.2 TEL. BIS 3575 6

The old way — loading now-obsolete coal-fired kilns — a dirty, laborious and unhealthy operation.

SPODE'S BONE CHINA

"The nearest ever to the fine Oriental porcelain yet devised for practical use..."

JOSIAH SPODE (1733-1797) persevered with hundreds of experiments before he finally discovered the wonderful translucent bone china—the nearest ever to the pure Oriental porcelain devised for practical use. In fact his introduction of bone china has been of outstanding importance in the annals of the English fine china trade. One of his eminent contemporaries, Monsieur Alexandre Brongiart, a Director of Sèvres, wrote at the time "Spode produced a better porcelain than any other which has hitherto been made in England."

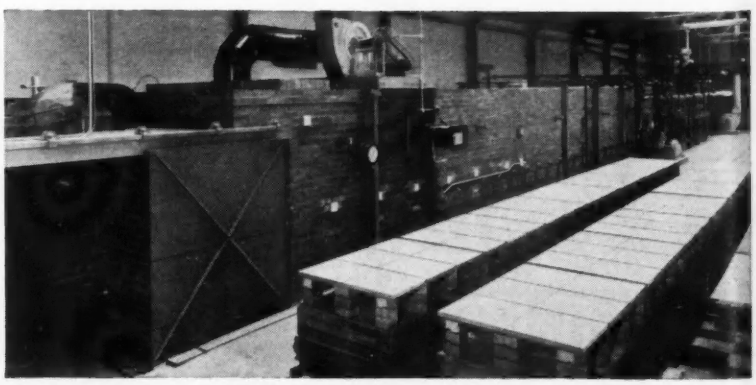
The marketing of this new Spode china became largely the responsibility of William Copeland, a Staffordshire-born tea broker who was living in London. Soon a firm Spode-Copeland partnership emerged of such an extent that the descendants of William Copeland have continued in the family business in an unbroken sequence to this day.

Nowhere in England, the home of the bone china trade, is fine bone china better produced than at W. T. Copeland's works. Within these works are produced dinner services in bone china, highly decorated with gold and colours, which sell for hundreds of pounds, and yet, also bearing the Spode insignia of manufacture, come tea services and dinner services which grace the tables of people in every walk of life.

But tradition is one thing and modern production is another. The world demand for Spode table ware had increased rapidly in the post-war years and in 1958 Mr. Spencer Copeland, the Managing Director, outlined the Board of Directors' decision. He said, "The outstanding feature is to be a tunnel kiln to fire biscuit bone china; it must be capable of firing, to a high standard, a volume of china varying from our present production to three times this amount." This was the problem presented to the Spode technical team headed by Mr. Ian Forse, the Manager. After investigation he approached a leading firm of kiln designers and builders and they agreed that there was no kiln which would give all the results Spode required. They interchanged ideas and a gas-fired tunnel kiln was developed to meet all their needs. It was christened "The Jubilee Oven" to commemorate its being lighted by the Lord Mayor of Stoke-on-Trent in the Jubilee Year.

The new way — the Pottery Queen lighting the new gas-fired tunnel kiln at the Spode factory. She is assisted by Mr. I. Forse, the Spode Works Manager.

Those particularly interested in firing pottery will be interested to know that the kiln is fired by gas and is 138 feet long, holding twenty-nine trucks of ware. The early preheat zone has sufficient controllable exhaust offtakes to make the early stages of the kiln practically dead when firing on a slow schedule. The loading height is flexible from two feet to three feet. The bottom burners have duplicate orifices, the higher or lower respectively being used to suit the loading height. The exhaust ports can also be adjusted in the same way. Gas is boosted to about 1 lb. per sq. in. pressure and is burnt through three tiers of burners with sixty-six burners on each side. These burners are divided into a total of six separate groups, five groups being automatically controlled. The burners in the top half of the kiln are separately controlled from those in the bottom



The new gas-fired kiln for firing biscuit bone china; capable of meeting present production and three times this amount economically.

half. There are three sections of cooling zones each comprising five separate controllable cavities. A Contravec heat control system at each end of the kiln provides a crown blast which prevents the heat from drifting to either end of the kiln. The peak temperature of the kiln is 1265°C and it takes about thirty hours to reach its peak.

In fact, the Spode Directors demanded flexibility of the fuel and of the kiln, together with the advantages of continuous running, for they required a kiln to fire from 700 dozen to more than 2,500 dozen articles a week, a most unusual demand. It has been specially designed to meet the most exacting circumstances for which no standard kiln would cater. It replaces the last of the old coal-fired bottle kilns which required two weeks from the time the work was put in until the time it was taken out. By comparison this new gas-fired tunnel kiln requires three days and gives an infinitely greater control of the temperature/time schedule than ever possible before, and the fuel cost is only half of that when coal was used.

There are, of course, a number of fuels which could have been used for this new advanced tunnel kiln. However, the Manager, Mr. Forse, said, "We selected gas because of its flexibility—it is possible to get more 'trim' on the individual flames in the kiln without the necessity of removing banks of heating elements." This flexibility, which enables the temperature in the various zones of the kiln to be closely controlled, coupled with low operating costs, ultimately led to the decision to use gas as the fuel. The West Midlands Gas Board produce in this area gas particularly suitable for firing the fine bone china manufactured by the Spode Company. Indeed, the ware can be fired in direct-fired kilns, in many cases being unprotected by saggers. The Spode Works use more than 150,000 therms of gas per quarter. They use other fuels as well, but, when it came to firing their newest and most advanced tunnel kiln, they chose gas.

Part of the well-known Crimson Lancaster bone china dinner service made by W. T. Copeland & Sons Ltd.

That the traditions of Josiah Spode are still maintained is appreciated when one walks round the showrooms of the Spode Company. Accompanying a selection of table ware there is a card bearing the following caption—"The Duke of Edinburgh prize for elegant design was awarded to Neal French Des.R.C.A. and David White, designers of the Spode Apollo Table Ware made by W. T. Copeland & Sons Ltd., and chosen for one of the eighteen Design Centre Awards in the competition held in 1960." This is not a design competition restricted to pottery, but is applicable to any industrial product. And now this Apollo Table Ware is being sold to all parts of the world as a modern example of the traditional bone china emanating from the researches of Josiah Spode.

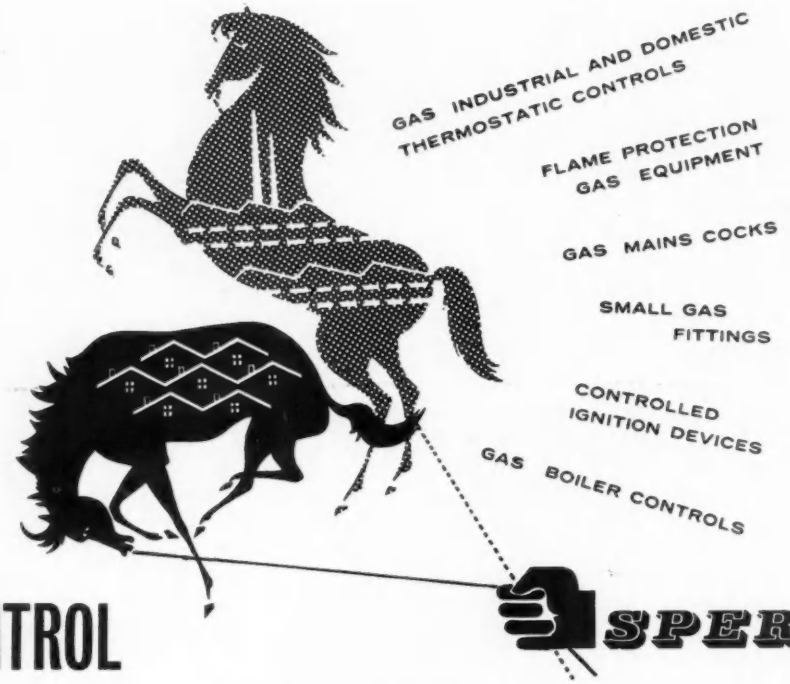
Spode is not an isolated example. In fact, the development of the pottery load is one of the outstanding success stories of the modern gas industry. Today there are many miles of gas-fired tunnel kilns in existence which have replaced the old smoky coal-fired bottle kilns. Completely smokeless in operation, they have literally changed the whole atmosphere of the Potteries, once notorious for dust and grime. The new tunnel kiln workroom at Spode provides pleasant, airy conditions comparable with those in the most modern light engineering works. No longer are its operatives old men at forty. At work and at home they are now enjoying the benefits of clean air—thanks to gas.

The Industrial Gas Engineers of the West Midlands Gas Board worked closely with Mr. Forse during his development of the kiln. This is just one example of the way in which Area Gas Boards collaborate with their consumers and exchange ideas for the ultimate benefit of all industrial users of gas.

Part of the Spode Apollo Table Ware awarded the Duke of Edinburgh prize for elegant design in 1960.

Scottish Gas Board, Edinburgh.
Northern Gas Board, Newcastle-upon-Tyne.
North Western Gas Board, Manchester.
North Eastern Gas Board, Leeds.
East Midlands Gas Board, Leicester.
West Midlands Gas Board, Birmingham.
Wales Gas Board, Cardiff.
Eastern Gas Board, Watford.
North Thames Gas Board, London, W.8.
South Eastern Gas Board, Croydon.
Southern Gas Board, Southampton.
South Western Gas Board, Bath.

The Gas Council, 1 Grosvenor Place. London, S.W.1. (Advertisement)



CONTROL SPERSOM

SPERRYN & CO. LTD.
MOORSOM ST., BIRMINGHAM 6 Phone ASTON CROSS 4011 (5 LINES)
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GAS FIRED GALVANISING BATHS

Two Gas Fired Galvanising Baths 18′ 6″ long x 1′ 6″ wide at the narrow end and 2′ 6″ wide at the wide end x 3′ 6″ deep.

DOWSON & MASON LTD
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